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NOTICES :—*All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.*

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The Alkali Industry

WE have from time to time expressed the view that the alkali industry is undergoing a slow metamorphosis when regarded from the chemical engineering and manufacturing standpoints. The ammonia-soda process is menaced by the electrolytic caustic soda one. It is not an easy matter to indicate the precise extent of the change, for so much depends upon circumstances. What appears probable is that soda ash, for many years yet, will still continue to be produced by the ammonia-soda process, which is peculiarly efficient in many respects. On the other hand, it is not unlikely that a large proportion of the world's requirements of caustic soda will be met by the concentration of weak caustic soda effluent arising from the electrolytic caustic soda plants. The extent to which such production will be possible will depend almost wholly on the ability to find markets for secondary products involving the use of chlorine. Hopes are entertained that the production of cellulose by the de Vains process will absorb increasingly large quantities of chlorine, and thus aid the development of the electrolytic industry.

In the Annual Review number of *Chemical and Metallurgical Engineering* there will be found an interesting article by Mr. E. M. Allen, president of the Matheison Alkali Works, Inc., of New York City, in

which the situation in America is discussed. Apparently there are five manufacturers producing alkali in America by the ammonia-soda process, while ten or eleven companies operate large plants of the electrolytic type. Three observations are outstanding in the article in question. It is remarked that singularly few industries require such an enormous amount of invested capital per ton of output as does the ammonia-soda process. Returns on capital alone depend on the sale of large tonnages, and records show that every fifteen years an ammonia-soda plant has to be rebuilt. The latter is rather interesting in view of a statement recently made by Sir John Brunner that his firm is now on full make in order to accumulate stocks prior to their new works at Wallerscote starting manufacture.

It is understood that this new works embodies every improvement from every works in the world where the Solvay process is in operation. From this it appears clear that those firms who worked the ammonia-soda process are not likely to succumb, even in the matter of caustic soda production, without a vigorous fight. It is an encouraging sign of the times, because nothing is more calculated to ensure increased efficiency, both from a chemical engineering as well as an industrial viewpoint, than a healthy struggle of this kind.

America and Sulphate of Ammonia

IN the same issue of our American contemporary there is an interesting summary of the conditions prevailing in the sulphate of ammonia industry in that country. During 1924 the total production of this fertiliser was rather less than in the previous year, in spite of the fact that the output from synthetic sources seems to have reached a record figure. In examining the sources of production in America one is immediately struck by the exceptionally small quantity which is provided by gasworks, the coke-oven undertakings accounting for over 90 per cent. of the total. This, of course, is explained by the fact that in America by far the greater part of the coal gas utilised for towns' purposes is produced in coke-ovens as distinct from the smaller carbonising chambers (retorts) which are common in this country. As to which type of plant is, purely from the point of view of ammonia yield, the most desirable it is difficult to say, for no figures are given as to the yield of sulphate per ton of coal in America. In this country, of course, it is quite possible with ordinary methods of carbonisation, provided care is taken to eliminate losses by volatilisation and during working-up, to obtain an average yield of some 26 lb. per ton of coal carbonised.

Since the war America has become an exporter of sulphate of ammonia, and now figures prominently in the Eastern markets. It is apparent, however, that she is well aware of the difficulty of holding her position in this market in the face of competition from England

and Germany. Demands from Japan and Java have shown obvious signs of tending to increase, and there is evidence that this business is returning to English producers who enjoyed the greater part of it up to the beginning of the war. In order that he may hold his Eastern markets, which now amount to more than a quarter of the total American output, the American producer is urged to deliver a quality as good as, if not superior to, that of the material coming from England and Germany. Formerly the 25 per cent. ammonia grade which was manufactured in America was of better quality than much of the English material, and the equal of Germany's; but in this country we have learnt a good deal in the last few years, and probably more than 80 per cent. of the material now turned out is up to 25½ per cent. of ammonia. In Germany, too, the process of manufacturing synthetic sulphate facilitates the production of a large-grained acid-free material of excellent quality, a point which can be borne out by the short but encouraging experience which we in this country have had with the synthetic product. In viewing the situation one has always to bear in mind, of course, that though the quality of the American material may not generally be up to that of our own there is always the possibility of America getting into the market by way of price concessions.

Problems of Filtration

FILTRATION in the laboratory seldom presents difficulties, and is accepted as an ordinary routine operation. Industrially it is as common, but almost invariably presents serious difficulties, as the number of patent filters, filter aids, and other devices on the market indicates. These devices are generally remarkably efficient when confined to their specific purpose; but in spite of them the majority of industrial filtrations have to be carried out by the old method of building up a thick cake on a woven filter cloth. This method is quite satisfactory in proper hands, but in many cases it requires considerable skill in operation, or trouble arises. A rule-of-thumb technique has been evolved, but the reason for the difficulties which arise has hardly yet been studied. It is to the credit of chemical engineers that the problems of filtration have been among the first they have tackled.

The paper read last week by Professor Hinchley before the Institution of Chemical Engineers, which reviewed the work carried out on the subject by Messrs. B. W. Clarke and S. G. M. Ure, shows clearly that there is much yet to be done, but a sound start has been made. As was mentioned in the course of the discussion, so far the results obtained seem to have little bearing on practical problems, but they show clearly that the matter is being tackled from a practical standpoint. The work was carried out by building thick cakes of one or two common materials on woven cloths of various types, and a study of the figures shows that a high degree of experimental accuracy was obtained. The investigations included determinations of the relationships between the percentage of solids in the cake and the pressures used in the filtration, the thickness of the cakes, and the percentage of solids in the pre-filt respectively.

Experiments were also made to determine the resistance of filter cloths at different pressures, the resistance of various thicknesses of cake at varying pressures, and so on. A valuable collection of data has been made, but no outstanding generalisations can be drawn from them at present, although considerable doubt is thrown upon the conclusions of Hatschek in 1908 on the arrangements of particles in the cake.

The work contains, however, a number of interesting observations, one of which has a particular attraction, in that Professor Hinchley stated it has so far baffled explanation. This is the fact that the ratio of the resistance of the filter cloth to the pressure in the liquid, which would be expected to be constant, shows a curious diminution when working with solutions containing about 4 per cent. of solids. Perhaps when this has been further investigated an explanation will present itself which will throw further light on the broader problems of filtration, as has so often been the case before in the history of science.

Lord Bearsted's Views on Oil Pollution

ALTHOUGH for over a year now legislation has been in force for dealing with the emission of oil from ships and for the prevention as far as possible of the contamination of navigable waters in this way, there seems to have been no great improvement in the general state of affairs in spite of the precautions which are now taken in the re-fuelling of oil-driven vessels and in other operations where some escape of oil might be looked for. The authorities responsible for watching over the matter are faced with peculiar difficulties in tracing the source of any pollution they may come across and in obtaining sufficient evidence as to justify the prosecution of an apparent offender. There is, in fact, a good deal of evidence to support the view that our present troubles in this respect had their origin during the war, and in a letter which he contributed to *The Times* on Saturday last Lord Bearsted bears out this view, and insists that there has been a great deal of misapprehension as to the cause of pollution. He recalls the fact that when during the submarine campaign the Germans deliberately set out to destroy oil tankers, the device was resorted to of adapting the double bottoms of ordinary ships for the transport of liquid fuel. It was successful, and the fate of our Empire might have been different had the method not been followed; but, as with the tankers themselves, the Germans sank at sight all merchant ships, and sank them by bombs, causing large holes in their sides. The oil, therefore, in the double bottoms was untouched, and has remained, and will remain, buried in the seas until corrosion, caused by time, permits the liquid fuel to escape. Such an explanation seems quite feasible, and assuming that it is correct then it would appear that the pollution trouble will exist for many years to come, for there is apparently no remedy short of raising every hull of ships which were sunk with oil in their double bottoms. This, of course, is an impossibility; but it is to be hoped that harbour and river authorities will give every consideration to Lord Bearsted's suggestion before attempting to hunt down and lay the onus on the more or less unoffending oil ship.

The Time Factor in Acid Production

OUR readers will recollect that during the past year we were able to give a good deal of important information concerning two systems of intensive sulphuric acid production—the Schmiedel Roller Box system and the Metro process—which, though comparative novelties, had attracted widespread attention owing to the phenomenally low time contact at which they were said to operate. We are now able to give a description of yet another intensive process which has been introduced by M. Gaillard, and which is operating with complete success on a technical scale at a Continental works. In an article elsewhere, Mr. P. Parrish discusses this system, and points out that M. Gaillard has succeeded in reducing actual chamber space to the remarkable figure of only 1.2 cubic feet per lb. of sulphur burnt per 24 hours. This result must, to the best of our belief, constitute a record, and if it can be maintained for a period with reasonable nitric acid consumption, and without undue wear and tear on the leadwork, it will go a long way towards weaning acid manufacturers from their present rather conservative adherence to the old and unwieldy chamber systems. There is much to recommend these new intensive systems of working, for in addition to a very appreciable saving in capital expenditure there is some considerable economy in the way of ground space. Doubt has been raised as to whether the expenditure on power for driving the mechanical parts, and the wear and tear of the same, might not offset some of the advantages which are claimed; but it is scarcely to be thought that the respective inventors can have failed fully to consider the incidence of these matters on the commercial efficacy of their processes.

Chemistry and Civilisation

As Mr. Woolcock rightly remarked, there are passages in the Hurter Memorial Lecture, delivered by Sir Max Muspratt on "Chemistry and Civilisation," and which we recently reported, which raise our conception of the services of chemical science to mankind completely out of the ordinary pedestrian economic ruts. While we cannot have too much science in the strictest technical sense, it is essential that the search for truth and the industrial application of its results should be leavened and saved from material exploitation by a steadfast regard for ideals, and a stirring message along these lines comes from a great industrial leader like this year's Hurter Lecturer with uncommon force. It is notable that so many minds to-day, searching for true lines of progress, should be turning back to Nature, and looking to such fields as bio-chemistry and radio-activity for the triumphs of the future. "Our best factory process," Sir Max declared, "does not compare in efficiency with Nature in a cornfield," and "the line of future chemical progress lies not only in copying but in wresting the secret processes of Nature from her." It is good to be reminded that civilisation cannot rest on material progress alone; that man is more important than industry; that the human factor must not be swallowed by the machine or civilisation is doomed. The Hurter Lecturer recalled and repeated with a new accent and emphasis the fine plea by Lord Leverhulme

in the Messel Lecture of last summer for that kind of higher vision without which people invariably perish; and very high among the sources of inspiration to all who have a feeling for these things must be the fact that such messages come from the greatest of our industrial statesmen.

Points from Our News Pages

- An interesting description of M. Gaillard's new process is given in an article on "The Intensive Production of Sulphuric Acid," by P. Parrish (p. 128).
Full reports are given of the papers read before the London and Birmingham Sections of the Society of Chemical Industry (p. 130).
The discussion on the paper "Studies in Filtration" is reported (p. 132).
"Chemistry in Life, Disease and Death" is the subject of an address by Mr. R. Furness (p. 132).
Our London Chemical Market report shows demand maintained and a healthy outlook (p. 140).
This has been an uneventful week in the Scottish chemical market and there is nothing outstanding to report (p. 143).

Book Received

- COLLOID CHEMISTRY. By Jerome Alexander. London: Chapman and Hall, Ltd. Pp. 208. 9s. 6d.
A TEXT-BOOK OF GLASS TECHNOLOGY. By F. W. Hodkin and A. Cousen. London: Constable and Co., Ltd. Pp. 551. 42s.
BISMUTH ORES. By Robert Allen. London: John Murray. Pp. 62. 3s. 6d.
ANTIMONY ORES. By Edward Halse. London: John Murray. Pp. 102. 5s.

The Calendar

Feb.		
9	Institute of Metals (Scottish Section): "Methods of Keeping Foundry Records." J. A. Gardner. 7.30 p.m.	39, Elmbank Crescent, Glasgow.
10	Royal Photographic Society: Second Conference on the Standardisation of Plate Testing Methods. 6 p.m.	35, Russell Square, London, W.C.1.
11	Institution of Chemical Engineers. Joint Meeting with the Chemical Engineering Group of the Society of Chemical Industry: "Critical Pressure Steam and its Influence on the Economy of Power Production." Mark Benson. "Submerged Flame Burners in relation to Internal Combustion Boilers and Evaporation Plant." Oscar Brunler.	Institution of Mechanical Engineers, London.
12	Optical Society: Annual General Meeting. 8 p.m.	Imperial College, South Kensington.
12	Oil and Colour Chemists' Association: "Synthetic Resins." A. A. Drummond.	8, St. Martin's Place, Trafalgar Square, London.
12	Society of Chemical Industry (Birmingham Section): "Iron in Antiquity." Dr. J. Newton Friend. 7.15 p.m.	The University Buildings, Edmund Street, Birmingham.
13	Institute of Metals (Swansea Section): "Season Cracking and its Prevention." Dr. H. Moore. 7.15 p.m.	University College, Swansea.
13	Institute of Metals (Sheffield Section): "Fuel and its Efficient Utilisation." Dr. C. H. Lander. 7.30 p.m.	198, West Street, Sheffield.
13	Society of Dyers and Colourists (Scottish Section): "Hydrogen Peroxide and Bleaching." I. E. Weber.	
13	Institute of Chemistry (Manchester Section): "Chemists and Alchemists in Art and Literature." R. B. Pilcher.	Manchester
14	Institute of Metals (London Section): "Some Notes on Refractory Materials." V. C. Faulkner. 7.30 p.m.	85-88, The Minories, Tower Hill, London.

Intensive Production of Sulphuric Acid

Patented Process of Monsieur E. A. Gaillard

By P. Parrish, A.I.C., M.I.Chem.E.

Our contributor describes the new process of M. Gaillard, of Barcelona, for the intensive production of sulphuric acid, and discusses its working results and application to existing plants.

DEVELOPMENTS in plant for the production of sulphuric acid have been very rapid during the last decade, and efforts are now concentrated on the most effective means of bringing burner gases, resulting from the combustion of either sulphur, spent oxide, pyrites or zinc blende into the most intimate and positive contact with nitrous acid of specific strengths, in order that the time factor in sulphuric acid production can be

Gaillard Process

It is always interesting to follow the various ways in which problems of an allied nature are approached and attacked by technicians of different countries. A development of which very little has been heard in the United Kingdom is now assuming significance on the Continent. The patented process of Monsieur E. A. Gaillard, of Barcelona, to which reference is made, aims at the intensive production of sulphuric acid. This process depends on the passage of burner gases through a curtain of acid in the form of a mist. The latter condition is created by the operation of a turbo-disperser (turbo-disperser) placed in the centre at the top of each tower chamber. Fig. 1 illustrates the arrangement.

By the rotation of the turbine, aided by an energetic helicoidal movement, cold acid is projected in the form of a very heavy rain against the internal circumference of the tower chamber, thus cooling in an effective way the lead walls. Some of the drops adhere to the lead and fall rapidly, forming a thin film of acid, which covers the walls in their entirety and creates a cooling action.

The other portion of the drops broken by the impact against the lead is divided into an infinitely large number of small vesicles, which rebound and fall, forming, as it were, a heavy-acid fog of a character which almost defies adequate description. The tower chambers are made slightly truncated, with the greatest diameter at the top. They are entirely void, no acid-resisting lining being regarded as necessary. The gases, before reaching the lead walls, must first traverse a veritable curtain of acid, in the shape of rain, which decomposes the nitrosyl sulphate, and condenses the acid already formed.

In order to ensure perfect irrigation of the walls, the projection grooves of the turbine have different angles. Some

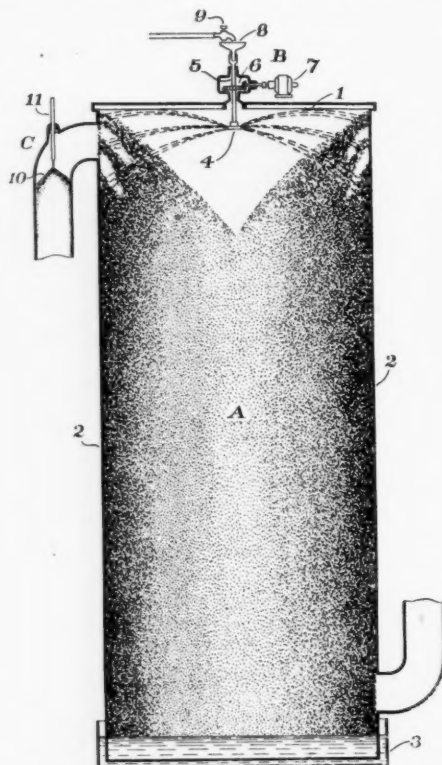


FIG. 1.—SCHEMATIC SECTION OF A GAILLARD TOWER CHAMBER.

- A.—Tower Chamber.
 1.—Top. 2.—Walls. 3.—Dish.
 B.—Turbo-disperser.
 4.—Turbine. 5.—Hollow shaft. 6.—Gearing. 7.—Electric motor.
 8.—Funnel. 9.—Acid cock.
 C.—Protection for Trunk Pipe.
 10.—Lead cone. 11.—Acid discharge.

reduced to the lowest possible limit compatible with steadiness of operation and economy.

It has been pointed out by the writer* that there appears to be no finality to the rapidity of reaction, as witness the bubbler tank and Schmiedel roller box systems. But there are important factors underlying these novel methods of acid manufacture, the soundness of which time alone will vindicate or refute.

The factors to which allusion is made are: (a) The extent of the horse-power absorbed per unit weight of acid produced; (b) the consumption of nitric acid or its equivalent per unit weight of sulphur represented by the acid made; and (c) the life of the plant.

It is too early yet to make any pronouncement on these aspects. Indeed, so far as the last-named phase is concerned, several years must elapse before anything definite can be indicated.

*THE CHEMICAL AGE, March 29, 1924. Vol. X., No. 250, pp. 316-18.

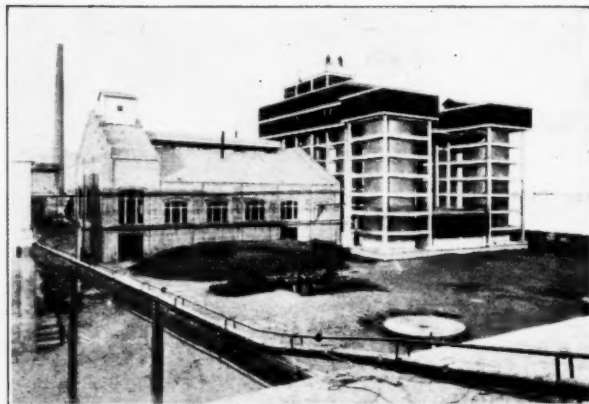


FIG. 2.—GENERAL VIEW OF GAILLARD INTENSIVE SULPHURIC ACID PLANT AS ERECTED AT SAN CARLOS.

are horizontal; others are more or less inclined above or below the horizontal in such a manner that the lead walls at different heights receive the projected cold acid. By reason of the form which the tower chambers take, uniform distribution and the maintenance of a constant pellicle of acid on the walls are alike ensured. It should be noted that the acid is projected in a way which communicates an energetic rotative movement to the gases, and fresh surfaces of contact are incessantly presented to the rain of cold acid. Obviously, chemical action is accelerated, and the production of acid is extraordinarily intensive, dependent on the quantity of nitrogen oxides in circulation and on the extent to which cold acid is dispersed in the towers.

The usual apparatus for providing atomised water to the tower chambers can be dispensed with, as water can be added in suitable quantity to the acid which is normally fed to the turbo-disperser.

Application of the Gaillard Process

The process of M. Gaillard has been installed at a new works constructed for La Société Vasco-Andaluz de Abonos à San Carlos, near Malaga, a general view of which is furnished in Fig. 2. The skeleton framework of the tower chambers and the Glover and Gay-Lussac towers is constructed of reinforced concrete, as is indicated in Fig. 3. The position of the turbo-disperser at the top of the tower chambers is shown in Fig. 4. These towers are exposed to the air; no protection or hoarding of any kind is provided.

The plant comprises:—Three mechanical pyrites burners, each with a capacity of 5 to 6 tons (a fourth burner will be installed shortly, in order to increase the production and allow of the chamber capacity being adequately utilised), with a dust chamber of the electrical precipitation type. The Glover tower is 11 ft. 6 in. diameter by 37 ft. 6 in. high. There are four tower chambers, each 19 ft. 8 in. diameter by 49 ft. 3 in. high, having a total effective capacity of about 1,500 cubic metres—i.e., 52,930 cubic feet. The two Gay-Lussacs are each 10 ft. 8 in. diameter by 46 ft. high.

Working Results

The works burn Huelva pyrites containing 49–50 per cent. of sulphur. The anticipated production was 15 kilograms per m³. This performance has been largely exceeded, as is shown by the following results obtained during the sixty-one days of September and October:—

Average production of 116° Tw. acid 621,885 lb.
Effective capacity of the four tower chambers, 52,930 c. ft.
representing 2.6 c. ft. of chamber space per
lb. of sulphur per twenty-four hours.

Although the above results exceed the production originally counted upon, practical trials have demonstrated that by the atomisation of suitable strengths of nitrous acid on the first two tower chambers the activity of the last two as acid producers was reduced to a negligible quantity. The conclusion has been reached that it is possible to work the first two chambers up to an intensity of 40 kilograms of 53° Bé. acid per m³ per twenty-four hours.

Readers of THE CHEMICAL AGE will recall that the writer dealt with "The History of Void Tower Sulphuric Acid

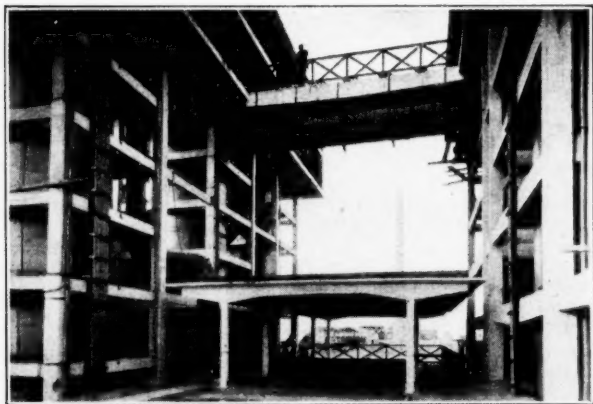


FIG. 3.—SAN CARLOS PLANT SHOWING REINFORCED CONCRETE SKELETON STRUCTURE.

Chambers" in an article† published in the issue of June 30, 1923, and traced the evolution of this type of plant. It was suggested that 9 kilograms of monohydrated sulphuric acid per m³ (that is, 3 cubic feet of chamber space per lb. of sulphur per twenty-four hours) was the limit of the capacity of the Moritz tower chambers. But the result indicated above, having reference to the Gaillard process, represents the phenomenally low chamber space of 1.2 cubic feet per lb. of sulphur per twenty-four hours. Indeed, it is clear that if this eminently satisfactory result can be maintained for a period with a reasonable nitric acid consumption, and without undue wear and tear on the lead, the Gaillard process will constitute a keen rival of other intensive systems.

†THE CHEMICAL AGE, Vol. VIII., No. 211, pp. 692-94.

Later Improvements

The writer is assured that as a result of the experience accumulated at the San Carlos plant subsequent installations can be erected at an appreciably reduced capital cost. The design of the turbo-disperser has been improved, the gearing shown in Fig. 1 having been dispensed with. The motor is placed at a higher point in relation to the turbo-disperser, which is entirely protected from acid splashes, and the power consumption is less than $\frac{1}{4}$ h.p. For the elevation of the acid, Monsieur Gaillard provides his own special double-acting pump of simple design.

The protection of the lead—both the walls and the ceiling—is completely assured. An analysis of the acid accumulated



FIG. 4.—SAN CARLOS PLANT SHOWING TURBO-DISPERSER IN THE CENTRE OF THE TOP OF THE TOWER CHAMBERS.

at the "drips" fails to show the presence of lead salts. The regeneration of the nitrous products and their absorption are successfully achieved. In future installations it is proposed to work with one void Gay-Lussac and one final packed Gay-Lussac.

Application to Existing Plants

By adding two void towers to existing acid plants of ordinary design, one tower being placed after the Glover, and the other after the last chamber, it is possible to increase the productive capacity of the plant appreciably, provided the Glover tower is of adequate size to deal satisfactorily with the extra volume of burner gases. The Gaillard process is also peculiarly adapted to the treatment of gases of low or high sulphur dioxide concentration.

It need scarcely be said that the development of this process will be followed with interest, not only on the Continent, but in this country.

Synthetic Sugar "Secrets"

IN referring to the lectures which Professor E. C. C. Baly has given throughout the United States, in which he described in detail his work comprising the synthesis of formaldehyde from carbon dioxide and water and the production of glucose from formaldehyde, *Industrial and Engineering Chemistry* now reports a development. They are now advised that representatives of a self-styled chemist are calling upon various large users of sugar and offering them an opportunity to back his enterprise, which consists, first, in the synthesis of formaldehyde; second, the polymerisation of this formaldehyde to glucose; and, third, the simple polymerisation of glucose to sucrose. He has not applied for a patent on his processes, but intends to operate in secret, and whenever asked leading questions takes refuge behind the statement, "That is a commercial secret and of course I cannot divulge it." Solicitations are made in person and nothing is written. Consequently it is difficult effectively to expose the project. Sugar consumers from coast to coast have been approached and the paper has been asked for details, the most important of which the "discoverers" withhold.

It is the public duty of chemists everywhere to give such advice as will help the gullible to protect themselves.

The Society of Chemical Industry

Papers on Kinetics of Hydrogenation and Tar Distillation

THE London Section of the Society of Chemical Industry met in the rooms of the Chemical Society, Burlington House, Piccadilly, on Monday, February 2. Dr. Bernard Dyer (Chairman of the Section) presided and Mr. J. LUSH read a paper on "Kinetics of Hydrogenation."

In the course of his paper, Mr. E. J. LUSH described the preparation and use of activated nickel turnings in a study of the kinetics of hydrogenation (*J.S.C.I.*, 42, 21, 1923). He then summarised the results obtained by the study of hydrogenation of oil in moving films (*J.S.C.I.*, 43, 11, 1924), and showed, by the following chart, the relation between the results obtained and those of other workers:—

Observer.	Type of Reaction.	Effect of Pressure.	Reference.
Fokin ..	Monomolecular	n in P^n	<i>Z. Angew. Chem.</i> 22, 1496 (1908)
Thomas ..	Monomolecular	$n = 1.5$	<i>J. Soc. Chem. Ind.</i> 39, 10T (1920)
Armstrong and Hilditch }	Linear	$n = 1.0$	{ <i>Proc. Roy. Soc.</i> , 96A, 137 (1919)
Maxted	Linear	$n = 1.0$	{ <i>J. Soc. Chem. Ind.</i> , 79, 120 (1920)
Richardson ..	Linear	—	<i>J. Soc. Chem. Ind.</i> , 40, No. 14 (1921)
Lush.....	Linear	$n = 0.5$	<i>J. Ind. Eng. Chem.</i> 16, 5 (1924)
Lush.....	Monomolecular	$n = 1.0$	<i>J. Soc. Chem. Ind.</i> , 43, 11 (1924)
			Present communication.

The investigation was continued in the present paper to the study of hydrogenation of oils in stationary films on the activated nickel turnings. It was shown, both in the closed and open type of apparatus, that the reaction under the stationary-film conditions was monomolecular and proportional to the hydrogen pressure. The disturbing influence which prevented complete agreement in the experimental results was shown to be due to the exothermic nature of the reaction causing the temperature of the catalyst to rise, with a corresponding rise in the value of K , the constant for a monomolecular reaction. A constant value of K was obtained experimentally by manipulating the external resistance to compensate for the heat of reaction.

Charts were shown, in which the results obtained were seen to conform to those to be anticipated from the experimental conditions employed, confirming the conclusions arrived at in the previous communication.

Tar Distillation

A second paper was read by Mr. C. O. CONDRUP and Dr. E. W. SMITH on "Tar Distillation by Means of the T.I.C. (Lead Bath) Process."

The paper first discussed certain broad aspects of tar distillation and pointed out that much could be done from the point of view of economic and rational working if a practice were made of never sending wet tars to distillers, and if small producers were to try to meet local requirements for prepared tars and pitches. In most cases they could not hope to turn out the wide range of products which a distiller could manufacture, but they could certainly separate out their valuable light oils and light creosote when working to a road tar and, in addition, when running to pitch, the heavy creosote and anthracene oils. The distillates so produced would be sent to distillers for separation into their ultimate constituents and for the manufacture of standard tar products. Three alternative schemes for tar distillation were outlined. (1) The producer dehydrates the tar and produces light oils and dehydrated tar, or light oils, light creosote and road tar, the distiller buying the oils and dehydrated tar. (2) The producer runs his tar to pitch and sells the tar distillates to a distiller. (3) The distiller buys the whole of the crude tar and distils it, but this procedure was not recommended. Horizontal and vertical retorts were then described and compared.

After a rapid review of some of the typical tar stills, a description of the T.I.C. plant, manufactured by a subsidiary

company of the Woodall-Duckham Co., was given. It was indicated that this plant offered many possibilities to gas undertakings and to the petroleum industry. The principle upon which the plant operated was the rapid transference of heat through the still bottom to the tar by way of a cushion of lead which enabled very large throughputs to be obtained from a small still with continuous operation and with only a small quantity of tar in circuit. The layer of tar undergoing distillation was but half an inch thick and the tar passed through the still in the short space of three minutes. The use of lead removed all chance of the formation of carbon growths on the still bottom and the crude tar was dehydrated so rapidly that priming, even in the case of such intractable tars as water-gas tars, did not occur, with the result that fire risks were entirely avoided. It was stated that very efficient fractionation was obtainable and that the nature of the residue was under complete control and could be varied at will to produce any desired type of residue.

A novel method of breaking up the pitch in the pitch bay was also described. A chain was arranged along the floor of the bay before the pitch was admitted, and was hauled up by means of a travelling winch when the pitch had solidified, with the result that the whole of the pitch was broken up into lumps of convenient size so that it may be removed conveniently. The Woodall-Duckham Co. had acquired the rights for this pitch breaker. Attention was then drawn to the use of the T.I.C. plant in connection with the preparation of "filled tars" and bitumen mixtures.

Discussion

Mr. W. J. A. BUTTERFIELD said that the whole question of the method of distillation of tar was whether it was better to distil the tar in small units of plant where it was produced or whether it should be passed on to large distilleries where large quantities were dealt with. Whilst the tar from the majority of horizontal retorts was a generally stable product and its value as a binding material remained practically constant, the tar from many of the newer processes was a relatively unstable body through molecular changes, oxidation or what might comprehensively be called ageing, which completely upset the calculations of the user, and tar distillers had to consider this matter. The competition from residual oil products, such as bitumen, for road purposes and briquetting was largely due to the fact that they were of a more uniform character than tar products.

Dr. W. R. ORMANDY said that he hoped to submit, for treatment in this process, a sample of tar which he had found exceedingly difficult to deal with and which might be capable of treatment by the authors. At the same time, they were touching on a very difficult problem in trying to persuade the small gas works to treat their own materials. In some cases it might be possible, in others it was hardly desirable. It was surprising to hear that vertical retort tars were better than horizontal retort tars. Incidentally, he noticed that the Government would not allow the so-called benzol produced from vertical retorts to be used as a denaturent because its specific gravity was wrong.

Mr. F. M. POTTER did not agree with the author that vertical retort tar was of necessity lower in phenols than horizontal retort tar, because his experience with tars from Glover-West and Woodall-Duckham plants was that this was not necessarily so. Indeed, he had found the reverse to be the case. Looking at the plant described in the paper as a complete distillation plant, he was not at all convinced that very large improvements could not be made in it. His impression was that the actual temperature of the tar in the lead bath still was not lower than it was in the ordinary pot stills and that had an important bearing on the formation of free carbon.

Mr. W. H. COLEMAN asked if the lead used in the plant remained fairly pure after use and whether sulphiding was caused by the sulphur in the tar. It also seemed that the tops would be affected fairly quickly as there seemed no provision to prevent condensation.

Dr. R. LESSING said that he would suspect certain catalytic influences on the lead used in the process and it would be interesting to know if sulphiding actually occurred. It was a

matter for consideration whether the best practice was to distil the crude tar at high temperature.

Mr. CONDUP replying to the discussion said that some of the information asked for was not available. The effects of ageing was hardly known yet. He had frequently looked for evidence of sulphiding of the lead of the plant, but so far it had not occurred. Even after several years there was no appreciable loss of lead. Mr. Potter had misunderstood him with regard to the phenols.

A Group of Interesting Research Papers

At the fifth meeting of the session of the Birmingham and Midland Section of the Society of Chemical Industry at the University of Birmingham last week several papers on research work at the University were read. Professor G. T. Morgan presided.

Messrs. E. A. COOPER, D. L. WOODHOUSE and G. E. FORSTNER in a paper on "Conditions Affecting Bactericidal Action," stated that the usual methods in use for the comparison of bactericidal power of disinfectants were serviceable for the standardisation of phenols, but were shown by results with unsaturated acids and nitroso compounds to be unsuitable for work correlating germicidal activity and chemical constitution, owing to the small amount of organic matter (culture medium) introduced with the organisms. The organic matter could be removed by diluting the culture (a dilution of 100 times was necessary) with sterile 9 per cent. saline solution, or by the centrifugal method. The latter method was preferable owing to the fact that a disturbing factor might be introduced by the diminution in the number of organisms entailed by the dilution method. The importance of removing the last traces of organic matter was illustrated by a table of results obtained with nitrosophenols and nitrosoanilines (when it was shown that, with *p*-nitroso-dimethylaniline, the germicidal power was increased nearly fifteen times by the removal of the traces of organic matter introduced with the culture). The effect of isomerism and increase in the time period on the activity of disinfectants was also considered. The introduction of alkyl groups in *p*-nitrosoaniline was favourable to bactericidal action up to a certain maximum, after which further substitution was detrimental. Symmetrical substitution as in *p*-nitrosodimethylaniline was more favourable than dissymmetrical substitution as in *p*-nitrosoethylaniline. The introduction of a second (-NO) group increased germicidal power in the absence of organic matter, but also increased the reactivity towards the constituents of the culture medium, with the result that in the presence of nutrient broth the disinfecting power was lessened.

The Higher Methyl-Ketones

Professor G. T. MORGAN and Mr. E. HOLMES, in a paper on "The Higher Methyl-Ketones," referred to the fact that the higher methyl-ketones of general formula $C_n.H_{2n+1}.CO.CH_3$ offered a means of identifying some of the higher fatty acids by their degradation to better known acids having one carbon atom fewer. Furthermore, they were the starting materials for the preparation of the homologues of acetylacetone.

Williamson, in 1852, first suggested the dry distillation of metallic salts of fatty acids to give ketones, and the method was used extensively by Krafft, about 1880, and was now known by his name. The method was later modified by Young and Ludlam, their apparatus consisting of a glass vessel surrounded by a sulphur vapour bath, nitrogen being employed to sweep out the resulting ketone.

In the present work two methods were used for preparing the barium salts. The first, in the case of caprylic and pelargonic acids, was to precipitate the acid as its salt from aqueous alcohol solution with barium hydroxide. In the second method the higher acids were dissolved in alcohol, neutralised with ammonia or sodium carbonate, and the salt precipitated with barium acetate. The mixture was then heated for ten minutes and the suspension filtered off hot. In both cases the salts were washed with small quantities of water and alcohol and dried in the oven at 80° C.

The apparatus used for the distillation was a modification of that used by Baker and Ingold. It consisted of an aluminium or cast iron still, with a bolted lid having an asbestos-graphite vacuum-tight joint, and a wide exit tube connected to two suitably cooled receivers. Each barium salt was intimately

ground with three molecular proportions of barium acetate, a thin layer put in the still, and heating commenced. The pressure in the apparatus was initially reduced to below a millimetre, but rose considerably as the excess barium acetate evolved acetone. Purification of the distillate was effected by dissolving in an alcohol ether mixture, adding animal charcoal, and filtering through a jacketed funnel. The ether was removed and the ketone precipitated by adding water. The methyl ketone was converted to its bisulphite compound and liberated in the pure condition by caustic soda. By this general method the ketone of this series, where $n=7, 8, 11, 13, 16, 17, 19$, were prepared from the corresponding acids. Methyl *n* nonadecyl ketone, $CH_3.CO.C_{19}H_{39}$ was obtained from eicosanic acid, the C_{20} straight chain acid, which itself was prepared by potash fusion of erucic acid. Purified by crystallisation from petroleum ether it was a colourless, waxy solid, melting at 61° C.

The Claisen Reaction

Professor MORGAN and Mr. E. HOLMES presented a second paper on "The Claisen Reaction."

This preparation of the diketones, having the end group of acetylacetone substituted by chains of seven to nineteen carbon atoms, was undertaken firstly as a preliminary to an extension of the work on tellurium diketone bactericides, and, secondly, because some doubt had previously been thrown on the generality of the reaction. It had been shown, however, that the reaction was quite general up to the point of obtaining a diketone with a chain of twenty-three carbon atoms. The condensation was carried out by adding the mono ketone to 3-9 mols. of ethyl acetate and one atomic proportion of sodium, and then refluxing for 2-5 hours. The amount of ester and the time of refluxing increased as the series was ascended. After cooling, the mixtures were poured on to ice, the diketones liberated by acidifying with acetic and then precipitated as their copper salts.

It was found that the melting point curve of the salts fell sharply from 286° in the case of copper acetylacetone to 118° in the case of copper *n*-octoylacetone and the melting points of the rest of the series laid almost on a straight line roundabout 112°-114°. The free diketone may be obtained by treating the copper salt with dilute sulphuric in the presence of ether, the solvent being subsequently removed. In the case of the higher members it was necessary to add alcohol to the reaction mixture before it was possible to precipitate the copper derivatives. Three of those diketones had given rise to bactericidal tellurium compounds, the remaining members being still under investigation.

Professor Morgan was associated with Mr. C. J. ALLAN TAYLOR in a paper on "Cyclotelluropentanediones Containing Aliphatic and Aromatic Substituents." The substance formerly described as tellurium dipropionyl-methane, the most highly germicidal compound of those series, had been shown to be 2:6-dimethylcyclotelluropentane-3:5-dione by conversion into its *dioxime*. The tellurium tetrachloride condensation took place smoothly with 3-methyldipropionylmethane, giving as sole product 2:4:6-trimethylcyclotelluropentane-3:5-dione-1:1-dichloride; this substance on reduction furnished 2:4:6-trimethylcyclotelluropentane-3:5-dione, which, however, was less active bactericidally than the foregoing 2:6-dimethyl compound. Hitherto the β -diketones which had interacted in the tellurium tetrachloride reaction to give cyclic derivatives had been largely aliphatic substances, but it had now been found that both 3-benzyl- and 3:3-dibenzyl-acetylacetone condensed to form cyclic telluridichlorides, thus extending the scope of the reaction to β -diketones of more varied type. The difficulty of isolating the cyclic telluridichlorides increased at first with the length of the hydrocarbon chain owing to the increasing solubility and fusibility of the products. This tendency was still noticeable with telluridichlorides from *n*-octoyl and *n*-nonoylacetones.

With β -diketones having terminal branched chains, formation of cyclic dichlorides did not occur. In a test case carried out with *diisobutyrylmethane*, 90 per cent. of the tellurium was eliminated as the free element and only a minute quantity of tellurium-*o*-ethyl *diisobutyrylmethane trichloride* was obtained. Certain regularities had been observed in regard to the melting and decomposition points of the copper and the cyclic tellurium derivatives of acetylacetone and its homologues.

Studies in Filtration

The following is a report of the discussion on the paper read by Messrs. B. W. Clarke, S. G. M. Ure, and J. W. Hinchley before the Institution of Chemical Engineers on Wednesday, January 28. The actual paper was summarised in THE CHEMICAL AGE last week.

PROFESSOR J. W. HINCHLEY, in presenting the paper, "Studies in Filtration," said that the work described in the paper was carried out by Mr. Clarke, who had held a Research Scholarship from the Department of Scientific and Industrial Research, but was compelled to give it up after one year. Unfortunately, the work was looked upon as preliminary work, because it was expected that Mr. Clarke would have been able to carry on for another year, and would have been able to round it off.

The Chairman, Mr. C. S. GARLAND, said that he hoped Professor Hinchley would be able to publish his microscopic work, because that was of very great importance in elucidating the manner in which cakes built themselves up. It had been mentioned that a cake $\frac{1}{2}$ in. thick appeared to obey the capillary law, but that cakes of lesser thicknesses appeared to diverge from the law. Professor Hinchley had said that that was what he would have expected. He did not follow why it should be so obvious that a cake $\frac{1}{2}$ in. thick should obey the capillary law, and that a cake of lesser thickness should not.

Mr. E. A. ALLIOTT said that he believed Hatschek was perfectly correct when dealing with theoretically rigid particles. Of course, particles never were theoretically rigid, and, in dealing with a cake, such, for instance, as calcium carbonate, one found, as was shown in one of the tables in the paper, that when one kept above a certain limit of pressure, an increase of pressure made very little difference in the result. There was one set of experiments which he would very much like to see carried out—and which might be a subject for a future paper—and that was the making of filtration tests, care being taken to get particles of uniform size in the prefilter by means of decantation or precentrifuging, or something of that kind. One could carry out a series of tests with particles of fairly definite, known and uniform size, and could take a number of different sizes, and then try the effect of mixing them in various proportions. That might throw some interesting light on what really went on in filter cakes. With regard to testing the amount of solids in the prefilter, the authors had chosen the method of taking some of the prefilter and evaporating it. He had found generally, for practical work, that the opposite method was the best, to get the cake and find the weight of moisture and the amount of filtrate that had come away from it. If one took the prefilter as pumped from the press, it was difficult to keep the solids all in suspension. Speaking of the test of the resistance of the filter cloth, he said he had noticed that some of the figures referred to the resistance of the cloth alone, without a layer of filter particles on it. He did not know that that method was really very much used, because it always seemed that the better method was to get the total resistance, and to find out from the filtration curves what proportion of the resistance was borne by the material and what was borne by the cloth. The actual resistance of the cloth itself was so small in comparison with the resistance of the cloth plus a tiny layer of particles, that he did not think the method of measuring the resistance of the cloth alone was of very great value.

The Treatment of Non-Compressible Solids

PROFESSOR E. C. WILLIAMS said that there was one point in the paper which they would all like to see very much amplified in the future, and that was with regard to the treatment of non-compressible solids. Aluminium hydrate had been mentioned, and any results of tests on that substance would be very interesting, because it was such an entirely different substance from the others mentioned and behaved in such an entirely different manner. It was very interesting to note the explanation given as to the reason why tap water might possibly break down the size of the particles. Was there any evidence to show that tap water did break them down and whether that was the real reason, because it was a well-known fact in commercial filtration that, to increase the amount of solids in the liquor to be filtered was a very good method of getting more porous cakes. If that were the effect in that case, it could not be due to the action of adding fresh water to the filtrate, and he wondered whether there was any definite reason for thinking that fresh water did break down the particles.

Mr. J. M. PHILLIPS felt that many of the results obtained confirmed Poiseuille's and Hatschek's laws, as one would really expect when dealing with solutions such as magnesium carbonate, where the particles were hard and would support one another, and did not form a plastic paste. At the same time the true value of research of this kind appeared hardly to be attained until one got more into the question of difficult filtrations. Possibly, in view of the development of automatic discharging centrifuges and that kind of thing, the easily filterable solutions which were dealt with in this case would be dealt with in that class of apparatus, or in rotary continuous filters, and it was only when one got to really difficult solutions that one came across the real difficulties of filtration. From observations that he had made in connection with various tests with these difficult solutions, he had formed the opinion that the laws which had been laid down in the paper did not apply. This, of course, was admitted by Hatschek and also by Walker and McAdam, that, with a more or less cellular structure, and with more or less clear capillary tubes, it was obvious that the liquor would rush through in some definite proportion to the pressure. But with a plastic mass, where the minute particles were all pressed out of shape, and made an impervious cake, the stage was quickly reached at which filtration almost ceased.

Four Definite Laws

Discussing the behaviour of solutions which were more difficult to filter, as compared with the solutions dealt with in the paper, he said that it appeared that in the paper there were four definite laws, which he, as a practical man, considered to be very good and definite, and which gave something to work upon. The four laws were: (1) That the thickness of the cake does not affect the percentage moisture of the cake; (2) that the percentage of solids in the prefilter does not affect the structure of the cake; (3) that pressure of filtration does not affect the cake (that, of course, was Hatschek's law); (4) that the rate of filtration is proportional to the pressure. In his experience of dealing with the more difficult solutions, only one of those laws appeared to apply, that one was the second.

Mr. A. J. V. UNDERWOOD said that he had tried to work out some sort of result on the basis that the law of flow through the cloth was different from the law of flow through the cake, assuming a linear flow through the cake, and a flow through the cloth proportional to the square root of the pressure. That, of course, would be true in the case of a metal cloth, but in the case of cotton it would be somewhat higher, probably the square. If the laws governing the flow through the cake and the cloth were not the same, a mathematical formula could be arrived at which takes this difference into account and should assist in reconciling the discrepancies observed between the experimental results and the Sperry formula in certain cases. (The full working out of such a formula was promised for the Proceedings.)

Mr. M. B. DONALD said that Professor Williams wished to attribute the increase in percentage solids in the cake to the fact that there was greater turbulence in the filter press. He suggested that a reasonable explanation for the increase in percentage solids in the cake lay in the fact that, for the cake having the highest percentage solids, the prefilter had the smallest amount of suspended matter in it.

Mr. J. A. PICKARD, of the Stream-Line Filter Co., also spoke, and compared the results given in the paper with results provided by the Stream-Line filtration.

Professor Hinchley's Reply

PROFESSOR HINCHLEY, replying to the discussion, said Mr. Alliott had suggested that Hatschek was right about rigid particles, but he himself was not quite sure about that. Although Hatschek might be exactly right so far as the percentage of voids was concerned, his law would not be correct in its application to filtration, because the resistance would be increased, and that was really the point; it was a question of resistance rather than of voids. He agreed with Mr. Alliott's remarks as to the resistance of cloth. It was perfectly reasonable to suppose that the flow through the cloth, although it might be streamline for an instant, was

practically turbulent the whole time, and that it would follow the usual law, $V = \sqrt{2GP}$, so that it would be in proportion to the square root of the pressure.

The remarks of Professor Williams were well worth thinking over, and he (Professor Hinchley) was inclined to think that there was a good deal in what Professor Williams had suggested with regard to the difference in the behaviour of air filters and filter presses.

The practical man was faced with the difficulty that he was filtering precipitates with ranges of thickness which were far too great, in order to satisfy himself commercially. The rate of filtration was so slow that he must really look to getting thinner cakes, and so we got the development of rotary filters and things of that sort, by which the substances could be handled in thin cakes, when the laws very closely applied. Experiments with the "Stream-Line" filter seemed to indicate that for the first minute layer of colloidal material deposited, curves were obtained which were exactly similar to those in the paper. As soon as a certain thickness was reached, the character of the filtration completely altered, and it became extraordinarily difficult, and he believed that, on the large scale, the solution of the problem was not to attempt to produce such thick cakes; if thick cakes were wanted, they could always be made up afterwards from some thin cakes.

THE CHAIRMAN proposed a hearty vote of thanks to the authors of the paper, and it was carried with acclamation.

PROFESSOR HINCHEY, in acknowledgment, paid a tribute to the work of Mr. Clarke.

Artificial Manures

WRITING to *The Times* in reply to a correspondent, Mr. F. C. O. Speyer, general manager of the British Sulphate of Ammonia Federation, Ltd., 30, Grosvenor Gardens, London, S.W.1, states "that all scientific agriculturists are aware that the well-known tendency of sulphate of ammonia (whether derived as a by-product of coal or by synthesis) to bring about an acid condition of the soil can be corrected easily and cheaply by the application of lime. Exhaustive experiments carried out at Rothamsted and other British experimental stations and results published by them show that sulphate of ammonia can be safely and profitably used on the farm provided lime is used in the rotation. But a soil which does not respond to sulphate of ammonia on account of soil acidity will not produce satisfactory crops with nitrate of soda or any other fertiliser until lime has been added.

"Sulphate of ammonia is now being used by farmers throughout the world at the rate of over 2,400,000 tons per annum, its consumption for agricultural purposes thus exceeding that of nitrate of soda. The most striking example of the successful substitution of sulphate of ammonia for nitrate of soda is the case of Germany, which country before the war imported 800,000 tons of Chile nitrate per annum, but has for the last eight years satisfied the requirements of its farmers by its own synthetic production of nitrogen, mainly in the form of sulphate of ammonia, the importation of nitrate having practically ceased. Sulphate of ammonia when properly used has a beneficial, not an injurious, effect on the soil."

"The Genesis of Petroleum"

ON Monday, February 2, Mr. L. W. Needham delivered a paper, entitled "The Genesis of Petroleum," before the University of Birmingham Chemical Society.

The difficulty of forming a comprehensive theory of the origin of petroleum was emphasised by a discussion of its chemical complexity and widely varying nature. The main features of petroleum geology were summarised and illustrated by diagrams showing sections of actual oilfields. This was followed by an account of the inorganic theories of origin including Mendeleeff's carbide theory and Sabatier and Senderens' catalytic hydrogenation theory. Recent experimental work was described and arguments for and against an inorganic origin discussed. Organic theories, together with experimental work bearing on them, were briefly outlined and the possible derivation of oil from vegetable matter (terrestrial and marine) and animal matter indicated. Special emphasis was laid on the work of recent investigators who were endeavouring to demonstrate the organic origin of petroleum. Attempts to explain the presence and significance of particular

properties and constituents of petroleum were described, and the paper concluded with a reference to two or three important oilfields and the special conditions obtaining there.

Chemistry and Life

The Need for Public Recognition of Its Importance

THE sixth meeting of Nottingham Section of the Society of Chemical Industry was held on Thursday, January 29, jointly with the Society of Dyers and Colourists, when Mr. R. Furness, M.Sc., gave a lecture entitled "Chemistry in Life, Disease, and Death."

The major part of the lecture was devoted to a consideration of the part which applied chemistry played in life, disease, and death of man, and Mr. Furness said that it was fitting and necessary that a high tribute should be paid to the fundamental work in pure chemistry ceaselessly carried on in our university and college laboratories. In a large degree the twentieth century lived on the brains of the nineteenth. The researches leading up to the formulation of the benzene theory which occupied chemists during the first half of the nineteenth century laid the foundation of the amazing coal-tar products industry of to-day, and instances of this type could be multiplied. But, it was urged, if chemists were to be truly appreciated by the general public they must employ upon occasion a less formidable terminology.

The Chemist and Food

Turning to a consideration of our food supply, chemistry had shown us how to produce adequate amounts of phosphatic, potassic and nitrogenous fertilisers. The greatest single factor in adequate plant fertilisation was fixed nitrogen. Natural fixed nitrogen was a failing resource, and it was satisfactory to know that nitrogenous fertilisers were now being made in this country from the nitrogen of the air. In a column of air a mile high only there was enough nitrogen over every square foot of the world's surface potentially to fertilise almost a million square feet of ground. Fixed nitrogen was essential in war for explosives' manufacture in addition, so that fixed nitrogen preparedness had become a dogma in the political and economic faith of a modern nation. No praise could be too high for those concerned in the bringing in of such a difficult technical process as the synthesis of ammonia from atmospheric nitrogen. The chemist was also rapidly coming to the fore with dependable and cheap insecticides and fungicides. Chemistry also played its part in the storage, transport, and preservation of our foodstuffs in general, and in the sterilisation and full purification of our water supplies. Textiles were wanted for the clothing of mankind, and although the chemist was required in all branches of textile industry, attention was confined mainly to the production of an artificial fibre, artificial silk, which was coming to rank as one of our most important textile materials. The various technical methods of production were described, and attention was directed to the latest improvements in the dyeing of cellulose acetate silk.

Passing rapidly over the work of the chemist in the provision of building materials, protective coatings and so forth, attention was called to the better utilisation of our fuel reserves. Smokeless combustion was necessary to the health of man, economy, and aesthetics. Chemistry would help in finding an outlet for the large amounts of low temperature tars produced in processes of low temperature carbonisation. The chemist also provided supplies of internal combustion fuel; and synthetic fuels and power spirits would be available if petrol supplies failed.

Chemistry had come to the aid of medicine; gradually disease was being wiped out of existence. In death dealing, also, chemistry had unfortunately recently come too much to the fore. It was contended, however, that the chemist was only to be debited with his own share of the responsibility for war. If the moral outlook of nations rendered war necessary, the chemist had his duty to his nation, and the terrible aid of chemistry had to be solicited. A review was given of the methods and materials of chemical warfare, but the chemist must work with everyone else for the "reign of peace in a world of beauty."

Mr. Furness, who is blind as the result of a chemical explosion during the war, now devotes much of his time to the presentation of chemistry in its various phases to the general public.

The Society of Glass Technology

Papers and Discussion on Glass Melting Furnaces

A MEETING of the Society of Glass Technology was held at Birmingham University on January 21, when Colonel S. C. Halse presided. The initial formal business included a resolution to send a cordial invitation, jointly with the English Ceramic Society, to the American Ceramic Society to visit this country in the summer of this year. It was also resolved to invite the Belgian members of the Society of Glass Technology to pay a return visit to this country in May.

The main business of the meeting was a discussion on "The Design of Modern Glass Melting Furnaces." This subject was introduced by two papers, illustrated by lantern slides. The first was: "Some Recent Developments in Furnaces and Gas Producers for Glass Works," by Mr. J. S. ATKINSON. The paper gave interesting information based on more extended experience of the "Stein" recuperative pot furnace. A new design of "Unit" pot furnace was also explained, each unit or section containing two pots. Each section was independently controlled, having its own set of recuperators, and gas and air valves, also separate chimney damper. One or two sections could be laid down in the first instance and other sections could be added as required. Turning to tank furnaces, the author described a very interesting design recently installed by Mr. T. C. Moorshead at the Charlton Works of United Glass Bottle Manufacturers, Ltd. The melting tank was shaped somewhat like a torpedo, hence the name—"Torpedo" tank. The merits of this furnace were stated to be:—(1) By eliminating the corners which the ordinary rectangular furnace had, a more rapid and uniform circulation of the glass was obtained; (2) the construction of the bridge, flared out as it was from the centre of the furnace, made it possible to ventilate or cool the side wall and bridge blocks much more efficiently; (3) the effective melting area was not reduced, but the volume of glass in the tank was reduced, giving higher melting efficiency.

Continuous Lehrs

Dealing next with continuous lehrs, Mr. Atkinson described a new design in which very radical changes had been made in the design of the conveyor belt and operating mechanism. The advantages claimed were (1) the high repair cost of the conveyor belts was practically eliminated; (2) stoppages necessitated by repairs to belt and the consequential loss of output were eliminated; (3) alternating current was as suitable as continuous current for the operation of the motor. The first cost of the installation of this new design was about the same as in the case of a lehr fitted with Stephens Adamson type belt. Referring to gas producers, a description was given of an automatic ash remover which assisted the Chapman agitator working on the top of the fuel bed to maintain a homogeneous fuel bed. A high rate of gasification and a very rich quality of gas resulted. The operation was very simple, and one man could operate from four to six producers.

The second paper, by Mr. TH. TEISEN, B.Sc., dealt with "Some Recent Developments in Furnaces and Gas Producers for Glass Works." The author observed that it would be well if glass works would more clearly define their needs and the ideal main lines to be worked on—whether output was to be the deciding factor, or thermal efficiency, life, and so on. In any case, the order in which these factors had to be placed must first of all be clearly defined, as that would decide the features of the design.

It had to be borne in mind that the use of automatic machinery had called for an increased output which, so long as it was not overdone, would raise the thermal efficiency. Following a discussion of the advantages and defects of the cross flame regenerative glass tank furnace, a comparison of it was made with the open-hearth steel furnace. The author expressed the opinion that in the case of small and medium-sized tanks, a high thermal efficiency might be more easily attained by the use of the recuperative type of furnace, where the width could be relatively small, and the length could be made correspondingly longer, the flame passing towards the working end.

The author exhibited lantern slides showing a proposal for an accessible bridge, which was obtained by giving the tank a wasp shape. Burners might be arranged at the end, and draw-offs on either side of this wasp-shaped bridge. In

conclusion, Mr. Teisen proposed the trial of an all-steel bridge cooled by water—the molten glass could be made to freeze round it and form a glass bridge. Although there might be some difficulties with the heating up before the glass was founded, he considered that this could be overcome by increasing the amount of cooling water, or it could be protected in other ways. The actual temperature, however, would hardly exceed that of the fire tube in a Cornish boiler.

The Structure of Atoms

Dr. Main Smith's Lecture at Birmingham University

THE ninth and last of the series of public lectures on "Atomic and Molecular Structure" by Dr. J. D. Main Smith, in the Chemistry Department of the University of Birmingham, related mainly to the distribution of electrons in atoms. After summarising the existing knowledge and theories of electronic atomic structure, the lecturer showed that the relevant chemical evidence was not merely supplementary to the mathematical and physical evidence, but was totally independent, and in fact supplied a radically different and complete answer to the problem of atomic structure. The chemical evidence could further be used to determine unequivocally the admissibility of the interpretations of atomic structure offered by other sciences, owing to the fact that chemical evidence was in its nature a series of positive answers to experimental atomic interrogations.

An outline was given of the chemical evidence on which the lecturer had, early in the previous year, elucidated the precise electronic structures of each of the 87 known and 92 possible sorts of elements. It was shown that the solution lay entirely in the chemical facts summarised by Mendeléeff in the periodic classification. By short-circuiting 10 elements in the first long period into the 2nd group with calcium, another 10 in the second long period into the 2nd group with strontium, and 24 in the third long period into the 2nd group with barium, the table was telescoped into a first period of 2 elements, and five periods of 8 each. The five periods of 8 exhibited a degree of similarity to one another just short of identity, and a remarkably regular gradation in properties from the alkali metals beginning to the inert gases ending each period. Close examination revealed that each 8 group consisted of two groups of 2 each and one group of 4, leading to the electronic sub-groups of 2, 2, 4 for each period, and that these sub-groups were completely preserved in all more complex atomic structures.

Seven Possible Chemical Periods

The telescoped table clearly indicated that there were only 7 possible chemical periods, and 7 main groups of electrons in atomic structures, these 7 groups being numerically identical with Bohr's quantum numbers. The chemical period of an element defined the group number in which the valency electrons existed, and thus the Bohr highest quantum number for the atom. The two sets of 10 excluded elements in the telescoped table further disclosed the existence of two additional groups of electrons of 4 and 6, thus leading to the complete electronic group of 2, 2, 4, 4, 6 at these stages. The excluded 24 elements could themselves be telescoped into a group of 10 by including 14 elements with lanthanum, this group having thus also the structure 2, 2, 4, 4, 6. The 14 excluded disclosed the further groups 6 and 8, the complete electronic grouping at this stage being 2, 2, 4, 4, 6, 6, 8. Those numbers were double the natural numbers each taken twice, and were identical with double the azimuthal quantum numbers deduced by Sommerfeld for the electronic orbits giving rise to line spectra. It was apparent also that the number of sub-groups in any periodic group was equal to one less than twice the number of the period, and that the largest sub-group contained electrons to the number of twice the period number. The period numbers being identical with Bohr's quantum numbers provided the necessary bridge between the chemical evidence and the theory of the quantised atom.

The lecturer further showed that the structures so deduced enabled two new natural laws to be clearly discerned. The first related to different atoms and the uniformity of their structures, whereas the second related to the parts of any single atom and the uniformity of plan of all the structural struts.

From Week to Week

LATVIA'S CHEMICAL INDUSTRY has practically doubled in numbers since 1921.

SIR ERIC GEDDES is to retire from the position of president of the Federation of British Industries.

THE MANUFACTURE OF PLASTICS FROM CASEIN is being attempted by the Erinoid Co. of America.

M. GEORGES CLAUDE has been elected a member of the French Academy of Sciences in the place of the late M. B. Chardonnet.

SIR MAX MUSPRATT contributes an article on "Synthetic Ammonia on a Large Scale" to the annual review of the *Manchester Guardian Commercial*.

APPLICATIONS ARE INVITED for two lectureships at University College, Leicester, in physics and in chemistry. Applications must reach the secretary of the college by February 13.

A LARGE CEMENT FACTORY is in course of construction at Rio Grande, Brazil. The company will be partly capitalised by public subscription and partly by Government loans.

SIR MAX MUSPRATT was one of the invited lay speakers at the Copec Conference on Friday, January 30. Sir Max spoke on "Property—its justification, privileges, and responsibilities."

ITALY'S OLIVE OIL industry shows signs of considerable revival, and the oil plants are being modernised and efficiency increased. Italy now takes second place as regards production, but leads as an exporter of olive oil.

THE RIGHT HON. T. R. FERENS has offered £250,000 as the nucleus of a fund for founding a University College at Hull. Mr. Ferens worked through the firm of Reckitt and Sons, Ltd., eventually becoming managing director.

TO CHEAPEN THE PRODUCTION OF ANILINE DYES in the Soviet Union the foreign section of the Supreme Economic Council at Moscow is requesting that half-manufactured chemical products be allowed to enter the country free of duty.

THE HOME SECRETARY has appointed Mr. J. W. Ogden to be a member of the Departmental Committee on artificial humidity in cotton cloth factories, in place of the late Mr. Joseph Cross, secretary of the United Textile Factory Workers' Association.

AT THE ANNUAL MEETING of Wailes Dove Bitumastic, Ltd., Mr. E. J. Dove resigned his position of managing director, and Mr. Charles Macdonald resigned his position as assistant managing director. They will continue as directors, and Mr. W. H. Dick has been appointed managing director.

PARADICHLOROBENZENE has been found by the U.S. Bureau of Entomology to be a dependable protection against clothes moths. This statement is of particular interest following the recent production of "Eulan," a preparation which, when applied in the process of manufacture, renders fabrics moth-proof.

PROFESSOR F. L. PYMAN, F.R.S., president of the Manchester College of Technology, Evening Students' Chemical Society, distributed associateship and other certificates at the meeting of the Society on January 27. A lecture also was given by Mr. J. Allan on "Further New Points Concerning Oils and Fats."

GERMANY'S IMPORTS for December totalled 1,308,680,000 marks, and exports 739,760,000 marks, against 1,047,700,000 marks and 643,260,000 marks respectively in November. There was a large increase in raw materials and manufactured goods. Exports of manufactured goods were 556,450,000 marks, against 494,200,000 marks in November, increases, being recorded in machinery, rolled iron and steel, dyes, chemicals, leather, electrical articles, and glass, while exports of textiles declined.

THE EARLY PAPERS describing the first investigations on colloid chemistry are being republished immediately by Ernest Benn, Ltd., for the Colloids Committee of the British Association, under the title of "The Foundations of Colloid Chemistry." The volume is under the editorship of Mr. Emil Hatschek, and includes papers by Michael Faraday, Thomas Graham, Francesco Selmi and Ascanio Sobrero, van Bommelen and others. Some of these papers have been actually unobtainable for a long time, and several have never before been translated into English.

THOMAS CLARKE AND SONS, dyers, of Loughborough, celebrates its business centenary this year.

FIRE CAUSED extensive damage to the oil refinery plant of the Caragon Refining Co. at Toledo, Ohio, last week.

SIR MAX MUSPRATT AND DR. G. C. CLAYTON have been re-elected president and vice-president respectively of the Widnes Chamber of Commerce.

THE BUSINESS EFFICIENCY EXHIBITION was opened at the Central Hall, Westminster, on Wednesday, by Viscount Burnham and will continue until February 14.

THE ANNUAL GENERAL MEETING of the Physical Society of London will be held at 5 p.m. on February 13 at the Imperial College of Science, South Kensington.

A NEW PROCESS for the manufacture of artificial silk is said to have been discovered by the A. G. für Anilinfabrikation, Berlin. This firm forms part of the Dyestuff Syndicate.

SIR WILLIAM BRAGG will lecture on "The Properties and Structure of Quartz," at 3 p.m. on Saturday, February 14, at the Royal Institution, 21, Albemarle Street, London, W.

IN A MONTHLY REPORT ON NITRATE Henry Bath and Son, Ltd., state that the French Government's subsidy to consumers of home-produced and German reparation nitrogen is 400f. per customer.

THE DEATH IS ANNOUNCED of Mr. C. H. Wordingham, C.B.E., a past-president of the Institution of Electrical Engineers and a member of the General Board and Executive Committee of the National Physical Laboratory.

MR. A. LUCAS, formerly director of the Egyptian Government laboratories and chemical expert to the Antiquities Department, has left Cairo for Luxor in order to resume work with Mr. Howard Carter's staff at Tutankhamen's tomb.

THE SCOTTISH OIL AGENCY, LTD., acting as distributors of National Benzol mixture in Scotland, intimates that the price has been advanced 1d. per gallon. The new wholesale price is 1s. 7d. per gallon in two-gallon cans—1d. per gallon more than No. 1 (standard grade) motor spirit.

THE BIRMINGHAM AND MIDLAND SECTIONS of the Institute of Chemistry and the British Association of Chemists held a successful social gathering at the Queen's Hotel, Birmingham, this week. Professor G. T. Morgan (Chairman of the Birmingham Branch of the Institute), presided.

A SOUVENIR OF THE BRITISH EMPIRE EXHIBITION, in the form of an illustrated booklet, has been issued by Burroughs, Wellcome and Co., London. Written in an interesting, descriptive style, the publication deals with the chief products of the firm, and an illustrated chapter is devoted to the manufacture of insulin.

PRELIMINARY PUBLICITY is already being given to the British Empire Exhibition 1925, and the enterprise shows every prospect of eclipsing the success of the first venture. The railway companies are at present considering special reduced charges, and the Exhibition authorities have arranged schemes to facilitate visits of parties.

A MEETING OF THE GLASGOW SECTION of the Society of Chemical Industry was held on January 29 at the Institution of Engineers and Shipbuilders. Mr. Douglas A. MacCallum, F.I.C., presided, and a lecture was given by Professor C. H. Desch, F.R.S., of Sheffield, formerly of Glasgow, on "Recent Developments in the Cement Industry."

THE BRITISH NON-FERROUS METALS RESEARCH ASSOCIATION, 71, Temple Row, Birmingham, is inviting applications for three junior research posts, namely, a physical chemist or metallurgist (for work on atmospheric corrosion), a metallurgist or chemist (for the study of the wastage of copper locomotive fire-box stay rods), and a metallurgist with good physics training (for the study of zinc and high-zinc alloys and their workability). The latest date for the receipt of applications is February 9.

THE TELEPHONE DEVELOPMENT ASSOCIATION, of 10-13, Bedford Street, Strand, London, has issued an interesting booklet setting forth the advantages of the expansion of telephone facilities. Two informative diagrams reveal the fact that Great Britain is third from the last in a list of the important countries compiled on the number of telephone conversations per capita per annum. Great Britain is lowest of all in a comparison of the number of telephones per 1,000 inhabitants, being even led by such countries as Iceland, Hawaii and Luxemburg.

References to Current Literature

British

- COSTING.**—Factory process returns and their use as a check on plant efficiency. J. A. Watson. *J.S.C.I.*, January 30, 1925, pp. 101-105.
- ACIDS.**—The constitution of natural unsaturated fatty acids. Part I. A new method of ascertaining the position of the ethylenic linkage in acids of the oleic series. E. F. Armstrong and T. P. Hilditch. *J.S.C.I.*, January 30, 1925, pp. 43-47 T.
- STEAM.**—How to increase your day load. Steam generation by means of town's gas. J. N. Williams. *Gas World*, January 24, 1925, pp. 65-67.
- COLOUR.**—Modern colour problems. The psycho-physical basis of colour measurement. L. C. Martin. *J. Roy. Soc. Arts*, January 16, 1925, pp. 196-212.
- COMBUSTION.**—The ignition of gases. Part V. Ignition by inductance sparks. Mixtures of paraffins with air. R. V. Wheeler. *Chem. Soc. Trans.*, January 1925, pp. 14-24.
- Limits for the propagation of flame in inflammable gas-air mixtures. Part II. Mixtures of more than one gas and air. A. G. White. *Chem. Soc. Trans.*, January, 1925, pp. 48-60.
- The explosion of acetylene and nitrogen. Part IV. Spectra of explosions of gases containing hydrogen, carbon, nitrogen and oxygen. W. E. Garner and S. W. Saunders. *Chem. Soc. Trans.*, January, 1925, pp. 77-81.
- The combustion of coke in one stage. G. Weyman. *J.S.C.I.*, January 30, 1925, pp. 47-50 T.
- COAL.**—Banded bituminous coal. Studies in the composition of coal. The oxidation of banded bituminous coal at low temperatures. R. V. Wheeler. *Chem. Soc. Trans.*, January, 1925, pp. 110-131.

United States

- CATALYSIS.**—The effect of water and of carbon dioxide on the catalytic oxidation of carbon monoxide and hydrogen by oxygen. A. B. Lamb and W. E. Vail. *J. Amer. Chem. Soc.*, January, 1925, pp. 123-141.
- On the mechanism of the inhibition of the catalytic action of platinum black and partially reduced nickel oxide by chlorine. M. C. Boswell and C. H. Bayley. *J. Phys. Chem.*, January, 1925, pp. 11-19.
- ABSORPTION.**—The absorption of nitrogen peroxide by silica gel. R. C. Ray. *J. Phys. Chem.*, January, 1925, pp. 74-86.
- PHYSICAL.**—The specific heats and latent heats of fusion of ice and of several organic compounds. O. Maass and J. Waldbauer. *J. Amer. Chem. Soc.*, January, 1925, pp. 1-8.
- The vapour pressures of some liquid and solid metals. R. W. Millar. *J. Ind. Eng. Chem.*, January, 1925, pp. 24.
- ANALYSIS.**—The behaviour of electrodes of platinum and platinum alloys in electrometric analysis. R. G. van Name and F. Fenwick. *J. Amer. Chem. Soc.*, January, 1925, pp. 9-28.
- Determination of chlorides by means of a temperature controlled titration, and some new experiments on the titration of mixtures of cyanides and halides. P. M. Dean and E. Newcomer. *J. Amer. Chem. Soc.*, January, 1925, pp. 64-67.
- Identification of amines. II. *m*-Nitrobenzenesulphonamides. C. S. Marvel, F. L. Kingsbury and F. E. Smith. *J. Amer. Chem. Soc.*, January, 1925, p. 166.
- Perfection of the chromic acid method for determining organic carbon. J. W. White and F. J. Holben. *J. Amer. Chem. Soc.*, January, 1925, pp. 83-84.
- HYDROXYLAMINE.**—The preparation of free hydroxylamine. C. de W. Hurd and H. J. Brownstein. *J. Amer. Chem. Soc.*, January, 1925, pp. 67-69.
- NITRATION.**—Nitration by means of a mixture of nitrosulphonic and fuming nitric acids. P. S. Varma and D. A. Kulkarni. *J. Amer. Chem. Soc.*, January, 1925, pp. 143-146.
- HYDANTOINS.**—Synthesis of the polypeptide hydantoin-N-1-methyl-L-tyrosyl-hydantoin-3-acetic acid. D. A. Hahn and

- A. G. Renfrew. *J. Amer. Chem. Soc.*, January, 1925, pp. 147-162 and 240-244.
- Researches on hydantoin. XII. The synthesis of hydantoin containing phenolic groups in the glyoxaline nucleus. R. D. Coghill and T. B. Johnson. *J. Amer. Chem. Soc.*, January, 1925, pp. 184-192.
- A method of synthesising 1:5-diarylhydantoin; 1:5-di-(*p*-hydroxyphenyl)-hydantoin. R. D. Coghill. *J. Amer. Chem. Soc.*, January, 1925, pp. 216-220.
- ACENAPHTHENE.**—Some derivatives of acenaphthene. F. R. Lorrman. *J. Amer. Chem. Soc.*, January, 1925, pp. 211-215.
- LEATHER.**—Vegetable tanning. A. W. Thomas and M. W. Kelly. *J. Ind. Eng. Chem.*, January, 1925, pp. 41-43.
- SUGAR.**—Inversion losses in cane sugar manufacture. C. F. Walton, M. A. McCalip and W. F. Hornberger. *J. Ind. Eng. Chem.*, January, 1925, pp. 51-56.
- HYDROCYANIC ACID.**—An improved method for the generation of hydrocyanic acid. F. V. Bichowsky. *J. Ind. Eng. Chem.*, January, 1925, pp. 57-58.
- EXPLOSIVES.**—Substitutes for nitroglycerine in explosives manufacture. C. L. Reese. *Chem. Age (N. York)*, December, 1924, pp. 481-483.
- WATER SOFTENING.**—Doulcon—a new base exchanging silicate. J. G. Vail. *Chem. Age (N. York)*, December, 1924, pp. 489-492.
- LACQUERS.**—Lacquers new and old. M. Toch. *Chem. Age (N. York)*, December, 1924, pp. 501-502.

German

- DYEING.**—The colouring of material for button manufacture—horn, mother-of-pearl, galalith, bakelite, etc. Fleming. *Färber Zeit.*, January 11, 1925, pp. 37-38.
- REACTIONS.**—The action of hydrohalogen and sulphuric acids on arylhydroxylamines. E. Bamberger. *Annalen*, January 26, 1925, pp. 297-318.
- JUTE.**—The cellulose of jute. A. Lehne and W. Schepmann. *Z. Angew. Chem.*, January 29, 1925, pp. 93-96.
- STARCH.**—The oxidation of amyloextrin. V. Syniewsky. *Annalen*, January 26, 1925, pp. 277-296.
- CONDUCTIVITY.**—Conductivity measurements in dilute methyl and ethyl alcoholic solutions at 0°, 25° and 56°. Some new conductivity measurements of non-aqueous salt solutions; dependence on temperature and concentration. P. Walden and H. Ulick. *Z. physikal. Chem.*, December, 1924, pp. 275-319.
- COLLOIDS.**—The preparation of colloidal elements by photochemical decomposition of their gaseous hydrides; colloidal arsenic. L. Dede and T. Walther. *Ber.*, January, 1925, pp. 99-102.
- On the crystallisability of super-cooled aqueous sols. H. Freundlich and F. Oppenheimer. *Ber.*, January, 1925, pp. 143-148.
- BASES.**—The constitution of the two isomers of dehydrothio-*m*-xylydine. R. Anschütz and G. Schultz. *Ber.*, January, 1925, pp. 64-66.
- ALKALOIDS.**—The cinchona alkaloids. Part VI. The action of sulphuric acid on some cinchona alkaloids; concerning apoquinine. G. Giemsa and K. Bonath. *Ber.*, January, 1925, pp. 87-96.
- ANTHRACENE.**—New condensation products from anthracene and phenanthrene. A. Schaarschmidt, C. M. Bugström and J. Sevon. *Ber.*, January, 1925, pp. 156-160.
- PHENANTHRENE.**—Phenanthraquinone-diazide; diamino-dioxy- and tetraoxy-phenanthraquinone. K. Brass and G. Nickel. *Ber.*, January, 1925, pp. 204-210.
- Phenanthrenequinone-3-azide and its decomposition by acids. K. Brass and G. Nickel. *Annalen*, January 26, 1925, pp. 217-227.

Miscellaneous

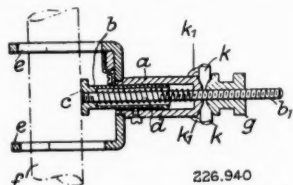
- SYNTHESES.**—Synthetic investigations in the quinine series. The production of aliphatic quinoxalines and monocyclic quinoxalones and carbinols. L. Ruzicka, C. F. Seidel and F. Liebel. *Helv. Chim. Acta*, December, 1925, pp. 995-1012.

Patent Literature

Abstracts of Complete Specifications

226,940. HOLDERS FOR CHEMICAL APPARATUS AND THE LIKE. A. Hossack, 28, Walter Street, Dennistoun, Glasgow. Application date, November 22, 1923.

This apparatus is for holding thermometers, flasks, glass tubes, etc., and the object is to obtain a quick release and to avoid excessive pressure on the apparatus. The cylindrical body *a* is held in any usual support, such as a retort stand, and contains within it a sliding plunger *b* having a movable jaw *c*. The plunger *b* also carries a screwed rod *b*¹ provided



with a nut *g*, and is forced outwards by a spring *d*. The thermometer or other object *f* is held between a pair of V-shaped jaws *e* by the pressure of the spring plunger *b*. The nut *g* when turned in one direction withdraws the plunger *b* and releases the object *f*, while movement of the nut *g* in the opposite direction allows the spring *d* to force the plunger *b* outwards. The pressure cannot be greater than that exerted by the spring *d*. To provide a quick release, the nut *g* and cylinder *a* may be separated by means of a wedge device *k*, which can be pressed into the groove between the two parts. For holding circular apparatus of a limited range of size, the jaws *e* may be replaced by a hollow cylinder into which a curved movable jaw is pressed by the spring.

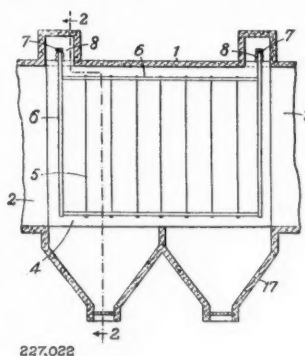
226,948. DYEING CELLULOSE ACETATE WITH WATER SOLUBLE SULPHONATED DYESTUFFS. British Dyestuffs Corporation, Ltd., 70, Spring Gardens, Manchester, and G. H. Frank, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, November 30, 1923.

Specification No. 182,830 (see THE CHEMICAL AGE, Vol. VII, p. 246) describes the dyeing of cellulose acetate with dyestuffs containing one or more active groups such as hydroxyl, amino, imino, nitro, nitroso, isonitroso, acidylamino, or azo groups provided that no sulpho group is present, or only one sulpho group and two or more active groups. It is now found that some dyestuffs coming under this definition, e.g., archil substitute, have no affinity for cellulose acetate while others which are isomers of archil substitute have an affinity for cellulose acetate. It has been found that the hydroxy group is not an active group in neutralising the effect of a sulpho group, but that it increases the action of the sulpho group. Monosulphonated azo dyestuffs containing no hydroxy group but having the sulpho group in the ortho position to the azo group have an affinity for cellulose acetate; also mono-azo dyestuffs obtained by combining an unsulphonated diazo compound containing no hydroxy group with a naphthylamine monosulpho acid in which the sulpho group is in the peri position to the amino or substituted amino group and which do not contain a hydroxy group. Suitable dyestuffs are the monoazo dyes produced by coupling diazotised *p*-nitraniline-*o*-sulphonic acid or diazotised 2:1-naphthylamine sulpho acid with *N*-alkyl or *N*-aryl substituted amines, particularly the substituted naphthylamines or with meta-toluylene diamine.

Examples are given of the use of dyestuffs from diazotised *p*-nitraniline-*o*-sulpho acid combined with one of the following:—dimethylaniline, diphenylamine, phenyl- α -naphthylamine, *p*-tolyl- α -naphthylamine, ethyl- α -naphthylamine, ethyl- β -naphthylamine, phenyl- β -naphthylamine, α - α' -dinaphthylamine, β - β' -dinaphthylamine, α -naphthylamine. Other suitable dyestuffs are *p*-nitraniline-azo-1:8-naphthylamine sulpho acid (peri acid) or *p*-nitraniline-azo-phenyl peri acid.

227,022. ELECTRICAL PRECIPITATION OF SUSPENDED PARTICLES FROM GASEOUS FLUIDS. Lodge-Cottrell, Ltd., 51, Great Charles Street, and Church Street, Birmingham. From International Precipitation Co., Inc., 1016, West Ninth Street, Los Angeles, Cal., U.S.A. Application date, April 3, 1924.

It has been found that when metallic collecting electrodes are employed in an electrical precipitation, there is a tendency for the electrical discharge from the discharge electrodes to become concentrated at various points in the electrical field, with a corresponding weakening at other points, so that the capacity of the apparatus is reduced. This concentration of the field produces a tendency to disruptive discharge which limits the potential difference which can be maintained. It is found that these disadvantages can be avoided if the collecting electrodes are made of material having a sufficiently high resistance, so that the electrical discharge is effectively distributed. It is also found that by using such electrodes the precipitated material is deposited in a non-adherent form on



the collecting electrodes, so that it falls off automatically and no jarring or scraping is necessary. A suitable material for the collecting electrodes is concrete or brickwork in dry condition. The resistance of the material may be controlled by incorporating in it a finely divided conducting material such as carbon or magnetic oxide of iron.

The precipitator comprises a flue *1* having inlet and outlet *2*. The collecting electrodes *4* are vertical and parallel to the gas stream so that they divide the flue into a number of parallel conduits. The electrodes are composed of slabs or walls of concrete or the like, or of wood. The discharge electrodes *5* consist of wires, rods, or chains, mounted on frames *6* which are carried by insulators *8*. The discharge electrode system is connected to a source of high tension unidirectional current. The deposited material is received in hoppers *17*. It is essential that the collecting electrodes should be approximately dry, and that there should be no tendency to deposit moisture from the gases. The apparatus is thus more suitable for treating gases from kilns or furnaces which are at a temperature above 100° C. The resistance of the collecting electrodes must be of the same order as the resistance of the electrical field. The use of these electrodes of high resistance reduces the tendency to "back discharge," which, due to the discharge from the deposit on the collecting electrodes, reduces the difference of potential which can be maintained.

227,039. QUANTITATIVE DETERMINATION OF HYDROGEN SULPHIDE IN ILLUMINATING AND OTHER GAS, APPARATUS FOR. Humphreys and Glasgow, Ltd., 38, Victoria Street, London, S.W.1. From W. H. Fulweiler, Wallingford, Delaware Co., Pa., U.S.A. Application date, May 12, 1924.

The object is to obtain a rapid test for small quantities, e.g., one-tenth of a grain to twelve grains per hundred cubic feet of hydrogen sulphide in illuminating gas. A casing *1* contains a vessel *4* having a detachable stopper *5*, with a five-foot burner *6* and a hook *7* to support a strip of filter paper *15*. Gas is supplied through a pipe *9* having a valve *10* and pressure gauge *11*, and the gas is passed through at a known rate per hour, e.g., 5 cubic feet. The strip of filter paper *15* is spotted with a number of solutions of different salts, which are reactive to different concentrations of hydrogen sulphide, forming sulphides of different colour. The solutions used, arranged in order of sensitiveness, are silver sulphate, copper sulphate, antimony trichloride, cadmium chloride, mercuric chloride,

bismuth trichloride. These solutions are contained in a row of small vials 18, into which a comb 17 is dipped, and the solutions are applied in spots to the strip 15. These compounds become coloured according to the concentration of hydrogen sulphide in the gas, e.g., if the top spot is grey-black, the concentration is one-tenth of a grain per hundred cubic feet.

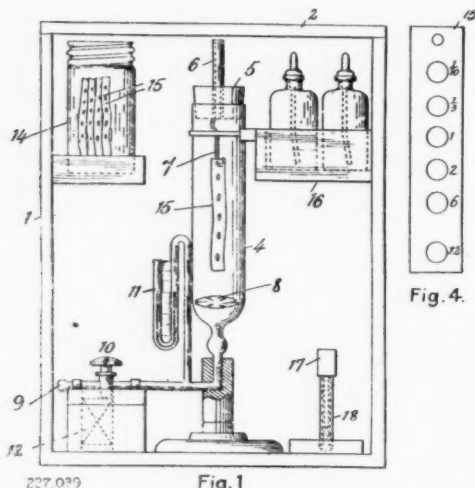


Fig. 1

If the second spot is black the concentration is one-third of a grain per hundred cubic feet, and so on. The lowest spot which shows colour is the one which indicates the concentration. The gas is passed through the vessel 4 for a known period, e.g., one minute. The necessary solutions are stored in bottles 15, and the paper strips in a container 14.

NOTE.—Abstracts of the following specifications which are now accepted appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention:—205,081 (Farbenfabriken vorm. F. Bayer and Co.) relating to manufacture of silicic acid gels, see Vol. IX, p. 638; 218,972 (A. Nathansohn) relating to obtaining products suitable for metallurgical treatment from zinc chloride solutions, see Vol. XI, p. 271.

International Specifications not yet Accepted

225,821. AMMONIA OXIDATION. I. W. Cederberg, 10, Friedrichstrasse, Steglitz, Berlin. International Convention date, December 4, 1923.

In the catalytic production of nitrogen oxides by combustion of ammonia, the walls of the apparatus are water-cooled to prevent flame combustion within the apparatus.

225,824. DIHYDROCODEINONE. Knoll and Co., Ludwigshafen-on-Rhine, Germany. International Convention date, December 7, 1923.

Thebaine is dissolved in hydrochloric acid, mixed with about 5 per cent. of platinum or palladium black, and agitated with hydrogen at ordinary temperature to obtain dihydrocodeinone. The product is precipitated with alkali and crystallised from alcohol.

225,833. ZINC OXIDE. Naamlooze Vennootschap Handelsmaatschappij Grikro, 66, Oudeschans, Amsterdam. International Convention date, December 3, 1923.

Zinc is vaporised in a muffle or electric furnace, and is burned as an issuing jet. Solid deposits around the outlet are avoided by directing a current of non-oxidising gas such as producer gas, hydrocarbons, or nitrogen against the outlet circumference. The protective gas may be pre-heated, and, if combustible, may be burned with air to produce a reducing flame. The outlet may be lined with a refractory heat-conducting material such as carborundum. Pure zinc oxide may be obtained by collecting only during the middle period of the distillation, the first and last portions being collected as metallic zinc or zinc dust. Several devices for protecting the outlet from deposits are described.

225,842. TREATING ORES. F. Johannsen, 405, Rollstrasse, Clausthal-on-Harz, Germany. International Convention date, December 7, 1923.

Ores, residues, etc., are mixed with sufficient fuel to reduce the volatilisable metals and provide the heat necessary in the process. The mixture is passed through a rotary furnace in an oxidising atmosphere, and oxides of zinc, tin, lead, cadmium, arsenic, antimony, and bismuth are recovered. Copper and nickel are recovered from the residue, and iron is recovered by agglomerating and treating with lime in a blast furnace charged with coke. The amount of fuel necessary in the rotary furnace may be reduced by passing in the blast furnace gases.

225,862. DYES. Farbenfabriken vorm. F. Bayer and Co., Leverkusen, near Cologne, Germany. International Convention date, December 5, 1923.

A diazotised dinitro-aniline sulpho- or carboxylic acid is coupled with an aromatic amine not containing a sulphonic group, but which may be substituted in the amino group, to obtain azo dyes. Examples are given, using as components 2:6-dinitraniline-4-sulphonic acid and β -naphthylamine or α -naphthylamine or ethyl- α -naphthylamine; 2:4-dinitraniline-6-sulphonic acid and ethyl- β -naphthylamine; 2:4-dinitraniline-6-carboxylic acid and ethyl- β -naphthylamine. The dyestuffs may be reduced with zinc and hydrochloric acid yielding 1:2:6-triaminobenzene-4-sulphonic acid, 1:2:4-triaminobenzene-6-sulphonic acid, and 1:2:4-triaminobenzene-6-carboxylic acid. These dyes are particularly suitable for dyeing cellulose acetate or formate, or cellulose ethers such as methyl- or ethyl-cellulose. Red, violet, and blue shades are obtained.

225,866. VULCANISING INDIARUBBER. E. Smith, 17, Via Arsenale, Turin, Italy. (Assignee of Soc. Lombarda Gomma, Milan, Italy.) International Convention date, December 6, 1923.

To accelerate the vulcanisation of indiarubber, about 2 per cent. of zinc α -phenyl biguanide is added. This substance is obtained by heating a mixture of α -phenyl biguanide and zinc oxide, or by precipitating from a solution of α -phenyl guanide or its carbonate or carbamate with an alkaline zincate. Alternatively, α -phenyl biguanide may be heated with zinc hydrate, with or without alkali; or a solution of hydrochloride, sulphate, nitrate, carbonate, or carbamate of α -phenyl biguanide may be heated with a soluble zinc salt and excess of caustic alkali. The accelerator is insoluble in cold water, soluble in boiling alcohol, and melts at 190° C.

225,875. SYNTHETIC DRUGS. Farbwerke vorm. Meister, Lucius, and Brüning, Hoechst-on-Main, Germany. International Convention date, December 7, 1923.

To obtain complex gold compounds of thiobenzimidazoles, a compound of the latter such as the acetic ester solution of thiobenzimidazole carboxylic acid is treated with a gold salt such as potassium auribromide, and the solution of the gold compound evaporated.

LATEST NOTIFICATIONS.

228,112. Process of dyeing furs, skins, hairs, feathers, or the like. Akt.-Ges. für Anilin-Fabrikation. January 23, 1924.

228,115. Process for the recovery or elimination of hydrated oxides of iron and calcium sulphate from sulphate solutions and hydrated oxides from chloride solutions containing these metals. Du Faur, J. B.

228,119. Wood preservation. Grasselli Chemical Co. January 23, 1924.

228,136. Method of and apparatus for refrigeration. Silica Gel Corporation. January 23, 1924.

228,165. Process for the manufacture of barium chloride and the simultaneous production of alkali hydrosulphide. Verein für Chemische und Metallurgische Produktion. January 21, 1924.

228,185. Processes and apparatus for the production of phosphoric acid. Victor Chemical Works. January 23, 1924.

228,195. Manufacture of isopropylallylbarbituric acid. Farbwerke vorm. Meister, Lucius, and Brüning. January 26, 1924.

228,203. Method of producing hydrocyanic acid from salts or compounds of sulphocyanic acid. Du Bois, J. A. June 29, 1923.

Specifications Accepted with Date of Application

200,834. Cellulose derivatives, Process of preparing. L. Lilienfeld. July 13, 1922.

207,791-2. Phenols and aldehydes, Process of producing transparent, hard, insoluble, infusible, light-coloured, colour-fast products of condensation from. L. Deutsch, I. Thorn, and Amalith Chemische Industrie Ges. November 30, 1922.

211,497. Aluminous cement in rotary furnaces, Process for the manufacture of. R. Decolland. February 14, 1923.

- 213,561. Dehydrating minerals, Method and mechanism for. W. R. Wade and New York Zinc Co., Inc. March 28, 1923.
- 213,914. Acetic acid from aqueous solutions thereof, Method for producing concentrated. Fabrique de Soie Artificielle de Tubize Soc. Anon. April 4, 1923.
- 218,237. Catalysts for the synthesis of ammonia. Ammonia Casale Soc. Anon. June 29, 1923. Addition to 197,199.
- 218,259. Grinding or pulverising apparatus. Raymond Bros. Impact Pulverizer Co. June 25, 1923.
- 224,488. Electrolytic methods of refining or reduction. Aluminium Co. of America. November 5, 1923.
- 227,481. Alphanaphthylamine, Process for the preparation of. E. Poma and G. Pellegrini. August 27, 1923.
- 227,491. Catalysts for the synthesis of ammonia, Production of. I. Casale. September 20, 1923.
- 227,501 and 227,774. Gas streams, Apparatus for the separation of particles from. M. W. Carty. October 11, 1923.
- 227,631. Base exchanging substances for softening water and removing iron and manganese therefrom, Process for producing. V. Kobelt. January 23, 1924.
- 227,660. Lead and zinc in roasted compound ores, Process for the separation of. A. Nathansohn. February 28, 1924.
- 227,689. Cyaniding devices. G. E. C. Rousseau. April 24, 1924.
- 227,726. Fuel, Complete gasification of—and the production of high grade gas. J. Rude. June 27, 1924. Addition to 218,925.

Applications for Patents

- Beale, E. S. L., Dunstan, A. E., and Pitkethly, R. Production of aromatic hydrocarbons. 2,646. January 29.
- Carpmael, W., and Farbenfabriken vorm. F. Bayer and Co. Manufacture of fungicidal media. 2,435. January 27.
- Carpmael, W., and Farbenfabriken vorm. F. Bayer and Co. Manufacture of pyrone dyestuffs. 2,856. January 31.
- Chemische Fabrik Griesheim-Elektron. Production of multicolour effects, etc., on vegetable fibre. 2,440. January 27. (Germany, February 7, 1924.)
- Chemische Fabrik Griesheim-Elektron. Production of phosphorus, etc. 2,632. January 29. (Germany, February 11, 1924.)
- Coley, H. E. Manufacture of photographic plates and films. 2,688. January 30.
- Coley, H. E. Apparatus for manufacture of zinc, etc. 2,689. January 30.
- Coley, H. E. Furnaces for reduction of ores or oxides. 2,690. January 30.
- Coley, H. E. Manufacture of thorium, cerium, etc. 2,691. January 30.
- Coley, H. E. Extraction of gold from arsenical ores. 2,692. January 30.
- Coley, H. E. Manufacture of barium sulphide and barium hydroxide. 2,693. January 30.
- Coley, H. E. Reduction of carbonates, etc. 2,694. January 30.
- Coley, H. E. Reduction of sulphates. 2,695. January 30.
- Du Bois, J. A. Production of hydrocyanic acid. 2,395. January 27. (Germany, June 29, 1923.)
- Farbwerke vorm. Meister, Lucius, and Brüning. Manufacture of isopropylallylbarbituric acid. 2,298. January 26. (Germany, January 26, 1924.)
- Farbwerke vorm. Meister, Lucius, and Brüning. Process of dyeing cellulose esters. 2,621. January 29. (Germany, January 29, 1924.)
- Gas Light and Coke Co. Process for softening hard calcareous materials, etc. 2,488. January 28.
- Gensecke, W., and Metallbank und Metallurgische Ges. Purification of oils and fats. 2,757. January 30. (Italy, February 15, 1924.)
- Gordon, K. Obtaining ammonia from synthesis gases. 2,661. January 30.
- Parke, V. E., Slade, R. E., and Synthetic Ammonia and Nitrates, Ltd. Drying gases for synthesis of ammonia. 2,454. January 28.
- Slade, R. E. Obtaining ammonia from synthesis gases. 2,661. January 30.
- Techno-Chemical Laboratories, Ltd. Interchange of heat. 2,745. January 30.

The Value of Sulphate of Ammonia

AN ingenious piece of propaganda has reached us from the British Sulphate of Ammonia Federation, Ltd. It consists in a well-constructed ready reckoner, which enables one to see at a glance the relative values of nitrogenous fertilisers as based on the unit value of nitrogen. The disc is turned until the current price for neutral sulphate of ammonia (21.1 per cent. nitrogen) is visible, when the values per ton of nitrate of soda and nitrate of lime are shown alongside, calculated for the same unit value of nitrogen. Copies of the ready reckoner may be obtained from the Propaganda Manager of the Federation, 28/30, Grosvenor Gardens, London, S.W.1, by mentioning THE CHEMICAL AGE.

"Sofnolite"

A New Reagent Described

IN an attractively produced booklet Sofnol, Ltd., give particulars of their new solid reagent for gravimetric CO_2 absorption, recently introduced under the above registered name. The reagent is, in fact, a soda-lime, which has been so modified as to bring its properties into line with the requirements of the analyst.

Soda-lime itself has been found unsuitable for gravimetric estimation of CO_2 because of its comparatively low absorptive capacity, and of the fact that, in a stream of dry gas, it tends to lose moisture. Large quantities would thus be required to absorb the gas from, say, a carbon combustion, while the moisture change would necessitate the use of a further weighed absorbent after the soda-lime. That these difficulties have been overcome in the new preparation is well evidenced by the excellent results obtained in analyses of pure carbon compounds using a single U-tube of "Sofnolite" to absorb the CO_2 .

In "Sofnolite" the alkali-lime base has been modified, and at the same time a manganese accelerator has been incorporated. It is claimed that the increased absorptive capacity is due largely to this addition, which has the further advantage of acting as an indicator. When CO_2 is passed over "Sofnolite," the original bright green colour of the reagent changes through red to a dull brown. This enables the progress of the reaction to be watched, and indicates when absorption is complete. Uncertainty, loss of time, and, in combustions, waste of oxygen, are thus avoided. The colour change is well shown in a coloured illustration forming the frontispiece of the booklet.

"Sofnolite," which is made at Greenwich, can be obtained from laboratory furnishers or direct from the makers. Those of our readers interested in analytical work will no doubt like to have a copy of the descriptive booklet. This may be obtained gratis from Sofnol, Ltd., Westcombe Hill, Greenwich, S.E.10.

Barytes Industry Amalgamation Failure

FREDERICK JOHN RYLAND, 196, Bishopsgate, E.C., engaged in the barytes industry, and in an attempt to amalgamate it, applied to Mr. Registrar Mellor at the London Bankruptcy Court, on Tuesday for his order of discharge. The debtor formerly represented a firm of lead manufacturers. In December, 1914, he began business as a mineral agent at 46, Queen Victoria Street, London, E.C., and his chief object was to deal in barytes, principally from Germany. Between 1915 and 1918 he acquired the leases of four mines in this country and developed them, installing plant and treating the ore, and so producing the refined substance for certain manufacturing industries. In September, 1920, the Ryland Barytes and Silica Co. was registered, with a nominal capital of £65,000, for the purpose of acquiring his interest in the mines and properties, and as vendor he received £21,000, which was satisfied as to £6,000 in cash and as to the balance by the allotment of 15,000 ordinary £1 shares, 8,500 of which were allotted to his nominees. He acted as a director of the company until the date of the receiving order, and since January, 1922, the company had been managed by a receiver appointed by the debenture holders. In June, 1921, the debtor removed to 194-6, Bishopsgate, E.C., and in the following March his mineral agent's business was acquired by a company of which he acted as a director until March last.

Since the early part of 1923 he had been chiefly engaged in an unsuccessful attempt to amalgamate the barytes industry.

Debtor attributed his insolvency to bad debts, principally salary from the Rylands Barytes Co., to the failure of another company with consequent liability under guarantee on their behalf, to heavy interest on borrowed money, to the non-fulfilment of the scheme, and to loss on trading.

The Official Receiver opposed the application on the grounds that the debtor's assets were not of a value equal to 10s. in the £; that he had omitted to keep proper books of account; that he had continued to trade with knowledge of insolvency; and that he had contracted a debt provable in his bankruptcy without reasonable or probable ground of expectation of being able to pay it. The discharge was suspended for two years and six months.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.

London, February 5, 1925.

THE demand during the present week has been maintained and, generally speaking, the outlook is healthy, while prices on the whole are well maintained, with one or two exceptions. Export inquiry continues fair and there is evidence of increased interest being shown by several markets.

General Chemicals

ACETONE meets with a poor demand and is quoted generally at £81 per ton ex wharf.

ACID ACETIC.—The demand for this product might be better and the price has a somewhat easier tendency; the average price quoted is £41 per ton for technical and £42 per ton for 80% pure.

ACID CITRIC is higher at 1s. 4½d. to 1s. 5d. per lb., and there is quite a good demand.

ACID FORMIC.—Price is unchanged and the material is in steady request at £53 per ton.

ACID LACTIC is a bright spot at £43 per ton for 50% by weight. ACID OXALIC is only moderately active and price firm at 3½d. per lb.

ACID TARTARIC.—There is an optimistic feeling in this article and the price is very steady at 1s. 1d. to 1s. 1½d. per lb., less the usual discount.

ALUMINA SULPHATE is unchanged in value with demand fair.

ARSENIC.—There is practically no change in this market and supplies are still being offered at from £30 per ton to £32 per ton.

BARIUM CHLORIDE is a shade easier but demand is good at £11 10s. per ton.

COPPER SULPHATE.—A satisfactory business is reported at the parity of £23 per ton.

CREAM OF TARTAR is unchanged and in poor demand at £77 per ton.

EPSOM SALTS.—Unchanged in value with demand good.

FORMALDEHYDE is as lifeless as ever and the nominal quotation is £44 per ton.

LEAD ACETATE.—While in brisk demand may be quoted a shade easier owing to the slight fall in the value of the metal; the value to-day is £47 10s. to £48 per ton for white and £45 to £46 for brown.

LEAD NITRATE is unchanged and active at £44 10s. per ton.

LIME ACETATE.—Continues steady at £14 10s. per ton for 80% grey.

POTASSIUM CAUSTIC is firm and is quoted at £32 per ton for 88/92% material.

POTASSIUM CARBONATE is unchanged.

POTASSIUM PERMANGANATE is firm at 8½ per lb., and in brisk demand.

POTASSIUM PRUSSATE.—Continues very strong and in rather short supply and is quoted at 8d. per lb.

SODIUM ACETATE is slightly easier and may be obtained at from £22 10s. to £23 per ton.

SODIUM BICHROMATE is unchanged at British makers' figures.

SODIUM HYPOSULPHITE is very active at recent quotations.

SODIUM PRUSSATE is in moderate demand and is quoted at from 4½d. to 4½d. per lb.

SODIUM SULPHIDE is unchanged.

Coal Tar Products

The market generally in coal tar products shows little change from last week.

90% BENZOL is still very scarce, the market being firmer. It is quoted at 1s. 10d. to 1s. 10½d. per gallon on rails.

PURE BENZOL remains unchanged at 2s. per gallon on rails.

CREOSOTE OIL remains firm, and is still quoted at 6½d. to 6¾d. per gallon on rails in the North, while quotations in London are 7½d. to 7¾d. per gallon.

CRESYLIC ACID is inactive, and is quoted at 1s. 10d. per gallon on rails in bulk for the Pale quality 97/99%, while the Dark quality 95/97% is quoted at 1s. 7d. per gallon.

SOLVENT NAPHTHA is unchanged at 1s. 4d. to 1s. 4½d. per gallon on rails.

HEAVY NAPHTHA is also unchanged at 1s. 2d. per gallon on rails.

NAPHTHALENE is quiet, with a slight improvement in the lower grades, which, however, are still offered at £4 10s. to £5 per ton, while 76/78 and 74/76 qualities are still quoted at £6 10s. and £5 10s. to £6 per ton respectively.

PITCH remains quiet and prices still show a weakening tendency. To-day's values are 45s. to 47s. 6d. f.o.b. London, 42s. 6d. to 45s. f.o.b. East Coast port, 40s. to 42s. 6d. f.o.b. West Coast.

Nitrogen Products Markets

Export.—During the last week the demand has continued steady as announced on January 28.

Home.—The home demand is a little brisker as usual at this season of the year.

Nitrate of Soda.—The market for nitrate of soda is unchanged. No large sales have been reported by the Producers' Association, and the business transacted has been at the same price as last week.

American Market Movements

(From Drug and Chemical Markets.)

HEAVY chemicals demand increasing in a small way. Prices continue generally firm. Lead pigments advanced again. Oxalic acid active. Prussiates strong. Barium salts higher. Arsenic reduced. Copperas lower in some quarters. Nitric acid very firm. Demand for intermediates reported as fair. Prices remain unchanged on most products. H. acid slightly lower. Aniline oil continues to gain in strength. Ortho-toluidine and ortho-nitro-toluene very firm. Benzene much easier. Toluene quite firm. Solvent naphtha easy. Pyridine steady. Cresylic acid, naphthalene and phenol continue dull with indications of price shading.

Vegetable oils continue quiet with prices showing no weakness. Chinawood oil steady. Linseed oil in slightly better demand at unchanged quotations. Coconut oil firm. Animal acids continue in an easier condition. Oleo oil in poor demand. Tallow steady. Fish oils very strong.

Fine chemicals continue in demand. Mercury scarce and firm. Potash permanganate generally held at 15 c. lb. Menthol active on spot and for shipment. Potash iodide steady. Codliver oil firm and higher prices predicted. Mercurials strong.

The German Chemical Market

(From Nicolaus Oláh, Hamburg 1, Alsterthor 1, Thaliahof.)

ALTHOUGH orders were not wanting, few transactions were carried out. There was a revival of business in chloride of magnesium, which on account of the numerous offers made, was quoted at £3 10s. This lowered price is chiefly due to the fact that larger transactions were made in this article at the beginning of the year, expecting all waterways to be frozen, which would have caused a great scarcity of merchandise at the port of shipment. As mentioned in my previous report, caustic potash is still in high demand, but buyers cannot be induced to accept on a basis of \$16. Business in caustic soda was in some degree satisfactory, but prices were rather low, large orders were executed on a basis of £16, on delivery of a few tons. Chlorate of potash continued to be in strong demand, prompt available goods were very scarce, larger quantities have been sold on a basis of \$9.60. Sulphide of sodium maintained its price, larger offers from some manufacturers having ceased. It is clear that naphthalene is still in strong demand, the season having only just begun, and for the present there is no change in price. The same remarks refer also to carbonate of potash, in which business was done on a basis of \$10.50 for larger quantities.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at retailers' works.

General Heavy Chemicals

Acid Acetic, 40% Tech.—£22 to £24 per ton.
 Acid Boric, Commercial.—Crystal, £45 per ton, Powder, £47 per ton.
 Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d., according to purity, strength and locality.
 Acid Nitric, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.
 Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 65s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.
 Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.
 Bleaching Powder.—Spot, £10 10s. d/d.; Contract, £10 d/d. 4 ton lots.
 Bisulphite of Lime.—£7 10s. per ton, packages extra.
 Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)
 Calcium Chloride (Solid).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carriage paid.
 Copper Sulphate.—£25 to £25 10s. per ton.
 Methylated Spirit 64 O.P.—Industrial, 2s. 7d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.
 Nickel Sulphate.—£38 per ton d/d. Normal business.
 Nickel Ammonia Sulphate.—£38 per ton d/d. Normal business.
 Potash Caustic.—£30 to £33 per ton.
 Potassium Bichromate.—53d. per lb.
 Potassium Chlorate.—3d. to 4d. per lb.
 Sal ammoniac.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton. Carr. pd.
 Salt Cake.—£3 10s. to £4 per ton d/d. In bulk. Firmer.
 Soda Caustic, Solid.—Spot lots delivered, £15 12s. 6d. to £18 per ton, according to strength; 20s. less for contracts.
 Soda Crystals.—£5 to £5 5s. per ton ex railway depots or ports.
 Sodium Acetate 97/98%.—£24 per ton.
 Sodium Bicarbonate.—£10 10s. per ton, carr. paid.
 Sodium Bichromate.—41d. per lb.
 Sodium Bisulphite Powder 60/62%.—£17 to £18 per ton, according to quantity, f.o.b., 1-cwt. iron drums included.
 Sodium Chlorate.—24d. to 34d. per lb.
 Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool. Nominal.
 Sodium Nitrite 100% basis.—£27 per ton d/d.
 Sodium Sulphide conc. solid. 60/65.—About £15 per ton d/d. Contract £14 15s. Carr. pd.
 Sodium Sulphide Crystals.—£9 5s. per ton d/d. Contract £9 2s. 6d. Carr. pd.
 Sodium Sulphide, Pea Crystals.—£15 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

Acid Carbollic Crystals.—54d. per lb. Slightly better demand.
 Crude 60's, 1s. 8d. to 1s. 9d. per gall. Market firmer.
 Acid Cresylic 97/99.—1s. 10d. to 2s. 1d. per gall. Pale, 95%, 1s. 7d. to 1s. 11d. per gall. Dark, 1s. 7d. to 1s. 11d. per gall. Markets weaker, little demand.
 Anthracene Paste 40%.—4d. per unit per cwt.—Nominal price. No business.
 Anthracene Oil, Strained.—7d. to 8d. per gall. Unstrained, 6d. to 7d. per gall.
 Benzol.—Crude 65's.—9d. to 11½d. per gall., ex works in tank wagons. Standard Motor, 4½d. to 1s. 6d. per gall., ex works in tank wagons. Pure, 1s. 9½d. to 1s. 11d. per gall., ex works in tank wagons. Supplies very scarce.
 Toluol.—90%, 1s. 7d. to 1s. 7½d. per gall. More inquiry. Pure, 1s. 11d. to 2s. per gall. Steady demand.
 Xylol Commercial.—2s. 3d. per gall. Pure, 3s. 3d. per gall.
 Creosote.—Cresylic, 20/24%, 8½d. to 9d. per gall. Better demand.
 Middle Oil, Heavy, Standard specification, 6d. to 7d. per gall., according to quality and district. Market firmer. Steady demand.
 Naphtha.—Crude, 8d. to 9d. per gall. Solvent 90/160, 1s. 3d. to 1s. 7d. per gall. Demand good. Solvent 90/190, 11½d. to 1s. 1d. per gall. Steady business.
 Naphthalene Crude.—Demand rather better. Cheaper in Yorkshire than in Lancashire. Drained Creosote Salts, £3 to £5 per ton. Demand rather better. Whizzed or hot pressed, £6 to £9 per ton.
 Naphthalene.—Crystals and Flaked, £12 to £15 per ton, according to districts.
 Pitch.—Medium soft, 40s. to 50s. per ton, according to district. Not much business.
 Pyridine.—90/160, 18s. to 18s. 6d. per gall. Not much demand. Heavy, 11s. to 12s.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.
 Acetic Anhydride 95%.—1s. 7d. per lb.
 Acid H.—3s. 9d. per lb. 100% basis d/d.
 Acid Naphthionic.—2s. 2d. per lb. 100% basis d/d.
 Acid Neville and Winther.—5s. 8d. per lb. 100% basis d/d.
 Acid Salicylic, technical.—1s. 0½d. to 1s. 1d. per lb. Good demand.
 Acid Sulphanilic.—9d. per lb. 100% basis d/d.
 Aluminium Chloride, anhydrous.—10d. per lb. d/d.
 Aniline Oil.—8d. per lb. naked at works.
 Aniline Salts.—8d. per lb. naked at works.
 Antimony Spotachloride.—1s. per lb. d/d.
 Benzidine Base.—3s. 8d. per lb. 100% basis d/d.
 Benzyl Chloride 95%.—1s. 1d. per lb.
 p-Chlorophenol.—4s. 3d. per lb. d/d.
 p-Chloraniline.—3s. per lb. 100% basis.
 o-Cresol 29/31° C.—3½d. to 4d. per lb. Poor demand.
 m-Cresol 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
 p-Cresol 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
 Dichloraniline.—2s. 3d. per lb.
 Dichloraniline S. Acid.—2s. 3d. per lb. 100% basis.
 p-Dichlorobenzol.—£85 per ton.
 Diethylaniline.—4s. 3d. per lb. d/d., packages extra, returnable.
 Dimethylaniline.—2s. 2d. per lb. d/d. Drums extra.
 Dinitrobenzene.—9d. per lb. naked at works.
 Dinitrochlorobenzol.—£84 10s. per ton d/d.
 Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works, 66/68° C. 1s. 2d. per lb. naked at works.
 Diphenylaniline.—2s. 10d. per lb. d/d.
 G. Salt.—2s. 2d. per lb. 100% basis d/d.
 Monochlorobenzol.—£63 per ton.
 a-Naphthol.—2s. 3d. per lb. d/d.
 B-Naphthol.—1s. per lb. d/d.
 a-Naphthylamine.—1s. 3½d. per lb. d/d.
 B-Naphthylamine.—3s. 9d. per lb. d/d.
 m-Nitraniline.—4s. 2d. per lb. d/d.
 p-Nitraniline.—2s. 2d. per lb. d/d.
 Nitrobenzene.—5½d. to 5½d. per lb. naked at works.
 o-Nitrochlorobenzol.—2s. 3d. per lb. 100% basis d/d.
 Nitronaphthalene.—10d. per lb. d/d.
 p-Nitrophenol.—1s. 9d. per lb. 100% basis d/d.
 p-Nitro-o-amido-phenol.—4s. 6d. per lb. 100% basis.
 m-Phenylene Diamine.—4s. per lb. d/d.
 p-Phenylene Diamine.—9s. 9d. per lb. 100% basis d/d.
 R. Salt.—2s. 4d. per lb. 100% basis d/d.
 Sodium Naphthionate.—2s. 2d. per lb. 100% basis d/d.
 o-Toluidine.—10d. per lb.
 p-Toluidine.—2s. 4d. per lb. naked at works.
 m-Tolylene Diamine.—4s. per lb. d/d.

Wood Distillation Products

Market quiet, American competition still fairly keen.
 Acetate of Lime.—Brown £11 to £11 5s. per ton d/d and upward.
 Quiet market. Grey, £15 to £15 10s. per ton. Firmer. Liquor, 9d. per gall. 32° Tw.
 Charcoal.—£7 5s. to £9 per ton, according to grade and locality. Fair demand.
 Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall. 24° Tw.
 Red Liquor.—10d. to 1s. per gall. 14/15° Tw.
 Wood Creosote.—2s. 9d. per gall. Unrefined.
 Wood Naphtha, Miscible.—4s. 9d. per gall. 60% O.P. Solvent, 5s. per gall. 40% O.P.
 Wood Tar.—£3 5s. to £4 per ton. Demand slack and stocks being held.
 Brown Sugar of Lead.—£44 per ton. Steady market.

Rubber Chemicals

Antimony Sulphide.—Golden, 5½d. to 1s. 4d. per lb., according to quality. Crimson, 1s. 4d. to 1s. 6d. per lb., according to quality.
 Arsenic Sulphide, Yellow.—1s. 11d. per lb.
 Barytes.—£3 10s. to £6 15s. per ton, according to quality.
 Cadmium Sulphide.—3s. 9d. to 4s. 3d. per lb., according to quantity.
 Carbon Bisulphide.—£30 to £33 per ton, according to quantity.
 Carbon Black.—6d. to 6½d. per lb., ex wharf.
 Carbon Tetrachloride.—£62 10s. to £67 10s. per ton, according to quantity drums extra.
 Chromium Oxide, Green.—1s. 3d. per lb.
 Indiarubber Substitutes, White and Dark.—5d. to 9½d. per lb. Demand very brisk. Prices likely to remain steady owing to firmness of rapeseed oils.
 Lamp Black.—£48 per ton, barrels free.
 Lead Hyposulphite.—7½d. per lb.
 Lithopone, 30%.—£22 10s. per ton.

Mineral Rubber "Rubpron."—£16 5s. per ton f.o.r. London.
 Sulphur.—£10 to £12 per ton, according to quality.
 Sulphur Chloride.—4d. per lb., carboys extra.
 Sulphur Precip. B.P.—£56 to £65 per ton.
 Thiocarbamide.—2s. 6d. per lb.
 Vermilion, Pale or Deep.—5s. 6d. per lb. Dearer.
 Zinc Sulphide.—7½d. to 1s. 8d. per lb., according to quality.

Pharmaceutical and Photographic Chemicals

Acid, Acetic 80% B.P.—£45 per ton ex wharf London in glass containers.
 Acid, Acetyl Salicylic.—2s. 11d. to 3s. 1d. per lb., according to quantity. Sales steady. Price firm.
 Acid, Benzoic B.P.—2s. 6d. per lb.
 Acid, Boric B.P.—Crystal £51 per ton, Powder £55 per ton. Carriage paid any station in Great Britain.
 Acid, Camphoric.—19s. to 21s. per lb.
 Acid, Citric.—1s. 4½d. per lb., less 5% for ton lots. Raw materials dearer, equal to 4d. per lb. on finished product.
 Acid, Gallic.—2s. 9d. per lb. for pure crystal, in cwt. lots. Easier.
 Acid, Pyrogallol, Crystals.—6s. per lb. for 1 cwt. lots. 7s. 6d. per lb. for 7-lb. lots according to quantity. Steady market.
 Acid, Salicylic.—1s. 5½d. to 1s. 6d. per lb., according to quantity. Steady market.
 Acid, Tannic B.P.—2s. 9d. per lb. Quiet steady demand.
 Acid, Tartaric.—1s. 1d. per lb., less 5%. Very firm. Demand good.
 Amidol.—9s. per lb., d/d.
 Acetanilide.—1s. 10d. to 2s. per lb. More inquiry.
 Amidopyrin.—14s. 6d. per lb.
 Ammonium Benzoate.—3s. to 3s. 6d. per lb., according to quantity.
 Ammonium Carbonate B.P.—£37 per ton.
 Atropine Sulphate.—12s. 6d. per oz. for English make.
 Barbitone.—12s. 6d. per lb. Cheaper. Market less firm for Potash and Soda Salts.
 Benzophenanthol.—5s. 3d. per lb. spot.
 Bismuth Salts.—Prices reduced by about 1s. 3d. to 2s. 3d. per lb. on account of the fall in the price of the metal.
 Bismuth Carbonate.—7s. 8d. to 9s. 8d. per lb. } Prices unsettled owing to difficulties in regard to supplies
 Bismuth Citrate.—8s. to 10s. per lb. }
 Bismuth Salicylate.—7s. 5d. to 9s. 5d. per lb. }
 Bismuth Subnitrate.—6s. 10d. to 8s. 10d. per lb. } of the metal.
 Borax B.P.—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
 Bromides.—Potassium, 1s. 8d. per lb., easier; sodium, 1s. 9d. per lb., easier; ammonium, 2s. 1d. per lb. Market less firm.
 Calcium Lactate.—1s. 7d. to 2s., according to quantity. Fair demand and steady market.
 Chloral Hydrate.—4s. per lb.
 Chloroform.—2s. 6d. per lb. for cwt. lots.
 Creosote Carbonate.—6s. 6d. per lb. Little demand.
 Formaldehyde.—£44 per ton, in barrels ex wharf London.
 Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 50%, 2s. 6d. per lb.
 Guaiacol Carbonate.—9s. 3d. per lb. Firmer.
 Hexamine.—2s. 11d. per lb. For bold crystal. Powder slightly less.
 Homatropine Hydrobromide.—25s. to 30s. per oz.
 Hydrastine Hydrochloride.—English make offered at 120s per oz.
 Hydroquinone.—4s. 3d. per lb. in cwt. lots. Foreign make.
 Hypophosphites.—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
 Iron Ammonium Citrate B.P.—1s. 11d. to 2s. 3d. per lb.
 Magnesium Carbonate.—Light Commercial, £36 per ton net. Light pure, £46 per ton.
 Magnesium Oxide.—Light Commercial, £72 10s. per ton, less 2½%; price reduced; Heavy Commercial, £25 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.
 Menthol.—A.B.R. recrystallised B.P., 50s. per lb., February delivery; Synthetic, 26s. to 35s. per lb. according to quality. English make. Increasing demand.
 Mercurials.—Market very quiet. Mercury slightly easier. Red oxide, 5s. 2d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 7d. to 3s. 9d. per lb.; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 3s. 10d. to 4s. per lb.
 Methyl Salicylate.—1s. 9d. to 1s. 11d. per lb.
 Methyl Sulphonel.—21s. per lb.
 Metol.—11s. per lb. British make.
 Morphine and Salts.—Reduced by 1s. to 1s. 3d. per oz.
 Paraformaldehyde.—2s. 8d. for B.P. quality.
 Paraldehyde.—1s. 4d. to 1s. 6d. per lb., in free bottles and cases.
 Phenacetin.—5s. 1d. per lb. in cwt. lots.
 Phenazone.—7s. per lb. Firmer.
 Phenolphthalein.—5s. per lb. for cwt. lots.
 Potassium Bitartrate 99/100% (Cream of Tartar).—86s. per cwt., less 2½% for ton lots. Raw material again dearer.
 Potassium Citrate.—1s. 10d. to 2s. 2d. per lb.
 Potassium Ferricyanide.—1s. 9d. per lb. Quiet.
 Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity. Steady market.

Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included. f.o.r. London.
 Potassium Permanganate.—B.P. crystals, 7½d. per lb., carriage paid; commercial, 8d. to 8½d. per lb., carriage paid. Forward prices higher.
 Quinine Sulphate.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.
 Resorcin.—5s. per lb. In fair quantities. Supplies exceed demand.
 Saccharin.—63s. per lb. in 50-lb. lots.
 Salol.—3s. 6d. per lb., for cwt. lots. Slightly dearer.
 Silver Proteinate.—9s. per lb. for satisfactory product light in colour.
 Sodium Benzoate, B.P.—1s. 10d. to 2s. per lb. From natural benzoic acid. Supplies of good quality available.
 Sodium Citrate, B.P.C., 1923.—1s. 11d. to 2s. 2d. per lb., according to quantity.
 Sodium Hypophosphite, Photographic.—£13 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.
 Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
 Sodium Nitroprusside.—16s. per lb.
 Sodium Potassium Tartrate (Rochelle Salt).—75s. per cwt., for ton lots and upwards.
 Sodium Salicylate. Powder, 2s. 2d. to 2s. 3d. per lb. Crystal, 2s. 3d. to 2s. 5d. per lb. Flake, 2s. 6d. per lb. Strong demand, market firmer.
 Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb.
 Sodium Sulphite, anhydrous, £27 10s. per ton, minimum 5 ton lots, according to quantity; 1 cwt. kegs included.
 Sulphonol.—14s. 6d. per lb. Little demand.
 Thymol.—18s. per lb. Firmer.

Perfumery Chemicals

Acetophenone.—11s. per lb.
 Aubepine.—12s. 6d. per lb.
 Amyl Acetate.—3s. per lb.
 Amyl Butyrate.—6s. 6d. per lb.
 Amyl Salicylate.—3s. 3d. per lb.
 Anethol (M.P. 21/22° C.).—4s. 6d. per lb.
 Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 9d. per lb.
 Benzyl Alcohol free from Chlorine.—2s. 9d. per lb.
 Benzaldehyde free from Chlorine.—2s. 9d. per lb.
 Benzyl Benzoate.—3s. 6d. per lb.
 Cinnamic Aldehyde Natural.—16s. 6d. per lb. Cheaper.
 Coumarin.—17s. per lb.
 Citronellol.—20s. per lb.
 Citral.—10s. per lb.
 Ethyl Cinnamate.—12s. 6d. per lb.
 Ethyl Phthalate.—3s. per lb.
 Eugenol.—10s. 6d. per lb.
 Geraniol (Palmarosa).—31s. 6d. per lb.
 Geraniol.—12s. 6d. to 20s. per lb.
 Heliotropine.—6s. 9d. per lb.
 Iso Eugenol.—16s. per lb.
 Linalol ex Bois de Rose.—26s. per lb.
 Linalyl Acetate.—26s. per lb.
 Methyl Anthranilate.—10s. per lb.
 Methyl Benzoate.—5s. per lb.
 Musk Ambrette.—50s. per lb.
 Musk Ketone.—42s. 6d. per lb.
 Musk Xylol.—13s. 3d. per lb.
 Nerolin.—4s. 6d. per lb.
 Phenyl Ethyl Acetate.—15s. 6d. per lb.
 Phenyl Ethyl Alcohol.—14s. 3d. per lb.
 Rhodinol.—50s. per lb.
 Safrinol.—1s. 10d. per lb.
 Terpeneol.—2s. 4d. per lb.
 Vanillin.—25s. to 25s. 6d. per lb.

Essential Oils

Almond Oil, Foreign S.P.A.—13s. 9d. per lb. Considerably cheaper.
 Anise Oil.—2s. 6d. per lb. Again cheaper.
 Bergamot Oil.—16s. per lb.
 Bourbon Geranium Oil.—28s. per lb.
 Camphor Oil.—65s. per cwt.
 Cananga Oil, Java.—11s. per lb. Cheaper.
 Cinnamon Oil, Leaf.—6d. per oz.
 Cassia Oil, 80/85%.—9s. per lb.
 Citronella Oil.—Java, 85/90%, 5s. 9d. per lb. Ceylon, 3s. 2d. to 3s. 5d. per lb., according to quality. Prices advanced.
 Clove Oil.—7s. 9d. per lb.
 Eucalyptus Oil, 70/75%.—2s. 1d. per lb.
 Lavender Oil.—French 38/40% Esters, 35s. per lb.
 Lemon Oil.—3s. 4d. per lb.
 Lemongrass Oil.—5s. 9d. per lb.
 Orange Oil, Sweet.—10s. 9d. per lb.
 Otto of Rose Oil.—Bulgarian, 42s. 6d. per oz. Anatolian, 28s. per oz.
 Palma Rosa Oil.—16s. 9d. per lb.
 Peppermint Oil.—Wayne County, 57s. 6d. per lb. Again dearer.
 Japanese, 20s. per lb. Cheaper.
 Petitgrain Oil.—9s. 9d. per lb.
 Sandal Wood Oil.—Mysore, 26s. 7d. per lb. Australian, 18s. 6d. per lb.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, February 5, 1925.

DURING the past week business in the Heavy Chemical Market has been rather quieter, and there is nothing of importance to record.

Industrial Chemicals

ACID ACETIC.—In little demand but prices unchanged, as follows: Glacial 98/100%, £57 to £68 per ton according to quality and packing; 80% pure quoted £43 to £45 per ton; 80% technical, £42 to £44 per ton, packed in casks delivered c.i.f. U.K. port, duty free.

ACID BORACIC.—Remains unchanged. Crystal or granulated, £45 per ton; powdered, £47 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—Unchanged at 5½d. per lb. delivered. **ACID CITRIC, B.P. CRYSTALS.**—Moderate inquiry and price unchanged at 1s. 4½d. per lb., less 5% ex store.

ACID FORMIC, 85%.—Quoted £52 per ton ex store, spot delivery. Offered from the continent at about £50 15s. per ton c.i.f. U.K. ports.

ACID HYDROCHLORIC.—In little demand, price 6s. 6d. per carboy, ex works.

ACID NITRIC.—80%, £23 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%. quoted 3½d. per lb., ex store. Offered for early delivery at a fraction less.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Unchanged at about 11½d. per lb., less 5%, ex store. Offered for forward delivery at about the same figure.

ALUMINA SULPHATE, 17/18% IRON FREE.—Quoted £6 10s. per ton, c.i.f. U.K. ports, prompt shipment. Spot lots available at about £7 5s. per ton, ex store.

ALUM.—Lump potash alum unchanged at about £9 15s. per ton, ex store, spot delivery. Offered from the continent at about £8 15s. per ton, ex wharf. Ammonium chrome alum of Brit sh manufacture quoted £17 per ton, f.o.b. U.K. port.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 6d. per lb., ex station. Containers extra and returnable, with possible slight reduction for large quantities.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton; packed in 5-cwt. casks, delivered U.K. port.

AMMONIA LIQUID, 880°.—In steady demand. Unchanged at 2½d. to 3d. per lb. delivered, according to quantity, containers extra.

AMMONIA MURIATE.—Grey galvanisers' crystals of English manufacture quoted £30 per ton, ex station, packed in casks. Bags £1 per ton less. Offered from the continent at about £28 per ton, c.i.f. U.K. port. Fine white crystals quoted £23 per ton, c.i.f. U.K. port.

ARSENIC, WHITE POWDERED.—Spot lots unchanged at about £36 per ton, ex store. Offered for early delivery at slightly less.

BARIUM CARBONATE, 98/100%.—Offered from the continent at about £9 10s. per ton, c.i.f. U.K. port.

BARIUM CHLORIDE, 98/100%.—Fine white crystals of continental manufacture quoted £9 15s. per ton, ex wharf. Large crystals of English manufacture on offer at about £11 10s. per ton, ex store.

BLEACHING POWDER.—Spot lots quoted £10 10s. per ton, ex station, contracts 20s. per ton less.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. port.

BORAX.—Granulated, £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. per ton, ex station. Continental quoted £4 2s. 6d. per ton, c.i.f. U.K. port.

COPPERAS, GREEN.—Unchanged at about £3 5s. per ton, ex works, packed in casks, free.

COPPER SULPHATE.—Moderate inquiry for export. British material now quoted £24 10s. per ton, f.o.b. U.K. port. Rather higher quotations from the continent, but spot material still obtainable at about £23 15s. per ton, ex store.

FORMALDEHYDE, 40%.—Spot lots now available at about £46 10s. per ton, ex store. Offered for prompt shipment from the continent at about £42 per ton, c.i.f. U.K. port.

GLAUBER SALTS.—White crystals of English manufacture unchanged at £4 per ton, ex store or station. Fine white crystals offered from the continent at £3 5s. per ton, c.i.f. U.K. port.

LEAD, RED.—Spot material available at about £45 10s. per ton, ex store.

LEAD, WHITE.—Now quoted £48 per ton, ex store.

LEAD ACETATE.—Little white crystals available, and quoted from £49 to £50 per ton, ex store. On offer from the continent at about £48 10s. per ton, c.i.f. U.K. port. Brown quality offered from the continent at about £42 per ton, c.i.f. U.K. port.

MAGNESITE, CALCINED.—Unchanged at about £7 17s. 6d. per ton, ex station, prompt delivery. Hard burnt quality quoted £4 15s. per ton, ex station. Finer quality of continental manufacture quoted £7 15s. per ton, c.i.f. U.K. port.

MAGNESIUM CHLORIDE.—Rather cheaper quotations from the continent. Now on offer at about £4 2s. 6d. per ton, c.i.f. U.K. port.

POTASH CAUSTIC, 88/92%.—Unchanged at about £31 per ton, ex wharf, prompt shipment from the continent.

POTASSIUM BICHROMATE.—Quoted 5d. per lb. delivered.

POTASSIUM CARBONATE, 96/98%.—Offered from the continent at £23 15s. per ton, c.i.f. U.K. port. Spot lots still available at about £24 15s. per ton, ex store. 90/92% quality offered from the continent at about £21 15s. per ton, c.i.f. U.K. port.

POTASSIUM CHLORATE.—Quoted 2½d. per lb., c.i.f. U.K. port. Spot lots on offer at about 2½d. per lb., ex store.

POTASSIUM NITRATE, SALTPETRE.—Quoted £26 per ton, c.i.f. U.K. port, prompt shipment from the continent. Spot lots on offer at £28 15s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Unchanged at about 8½d. per lb., ex store, spot delivery.

POTASSIUM PRUSSIAN, YELLOW.—Spot material advanced to about 7½d. per lb. ex store. Offered for early delivery at about 7½d. per lb., ex wharf.

SODA CAUSTIC.—76/77%, £18 per ton; 70/72%, £16 2s. 6d. per ton; broken, 60%, £17 2s. 6d. per ton; powdered, 98/99%, £21 7s. 6d. per ton. All carriage paid U.K. stations, spot delivery, contracts 20s. per ton less.

SODIUM ACETATE.—Now quoted £20 5s. per ton, c.i.f. U.K. port. Spot material on offer at about £23 per ton, ex store.

SODIUM BICARBONATE.—Refined recrystallised quality £10 10s., per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—Quoted 4d. per lb. delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station. Powdered or pea quality, £1 7s. 6d. per ton more. Alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English material now obtainable at about £9 15s. per ton, ex store. Continental quoted £8 5s. per ton, c.i.f. U.K. port. Spot lots available at about £9 5s. per ton, ex store. Pea crystals of English manufacture quoted £14 per ton, ex station.

SODIUM NITRATE.—Ordinary quality quoted £13 17s. 6d. per ton, ex store; 96/98% refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE 100%.—Offered from the continent at about £24 15s. per ton, c.i.f. U.K. port.

SODIUM PRUSSIAN, YELLOW.—Unchanged at 4½d. per lb., ex store

SODIUM SULPHATE, SALTCAKE.—Price for home consumption £3 10s. per ton f.o.t. works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE.—English manufacturers quote 60/65% solid, £15 per ton; broken, £1 per ton more; flake, £2 per ton more. Crystals, 31/34%, £9 5s. per ton, carriage paid U.K. stations, minimum 4 ton lots, with slight reduction for contracts over a period. Solid 60/62%, offered from the continent at about £12 per ton, c.i.f. U.K. port. 30/32% crystals at about £8 10s. per ton, c.i.f. U.K. port.

SULPHUR.—Flowers, £9 10s. per ton; roll, £8 10s. per ton; rock, £8 7s. 6d. per ton; ground, £8 5s. per ton. Ex store, prices nominal.

ZINC CHLORIDE.—96/98%, of continental manufacture, quoted £23 per ton, c.i.f. U.K. port. English material for export on offer at about £25 to £26 per ton, f.o.b. U.K. port.

ZINC SULPHATE.—Spot material quoted £12 10s. per ton, ex store, in little demand.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHYLAMINE.—Export inquiry. Price 1s. 3d. per lb. delivered.

ALPHA NAPHTHOL.—Good export inquiry. Price 2s. 2d. per lb., f.o.b.

AMIDO AZO BENZOL.—Good export inquiry. Price 2s. 8d. per lb., f.o.b.

AMIDO AZO TOLUOL.—Some export inquiry. Price 4s. 1½d. per lb., f.o.b.

BENZIDINE BASE.—Home and export inquiries. Price 3s. 8d. per lb., 100% basis.

BENZALDEHYDE.—Export inquiry. Price 2s. 2½d. per lb., drums included, f.o.b.

BENZYL CHLORIDE.—Some export inquiry. Price 1s. 6d. per lb., f.o.b., drums included.
 DIMETHYLANILINE.—Good inquiries. Price 2s. 2d. per lb., delivered.
 DI NITRO TOLUOL.—Fairly good home inquiry. Price 9½d. per lb., delivered.
 DIPHENYLAMINE.—Good export inquiry. Price 2s. 10d. per lb., f.o.b.
 G. ACID.—Some export inquiry. Price 3s. 10d. per lb., 100% basis, f.o.b.
 METANILIC ACID.—Small home inquiry. Price 3s. per lb., 100% basis.
 META PHENYLENE DIAMINE.—Export inquiry. Price 4s. per lb., f.o.b.
 META TOLUYLENE DIAMINE.—Export inquiry. Price 4s. per lb., f.o.b.
 ORTHO ANISIDINE.—Some home inquiry. Price 11s. 6d. per lb.
 PARA TOLUIDINE.—Small home demand. Price 4s. per lb., delivered.
 PARA AMIDO ACETANILIDE.—Some export inquiry. Price 4s. 11d. per lb., 100% basis.
 SULPHANILIC ACID.—Moderate home demand. Price 9d. per lb., 100% basis, carriage paid.
 TOLUOL PURE.—Price firm at 2s. per gallon, f.o.r. makers' works.

The Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT.)

Manchester, February 5, 1925.

RATHER more activity has been reported in some sections of the chemical market here since last report. Inquiries have been more numerous and actual business has been slightly better both for domestic consumption and for export. Small parcels for the continent have recently been disposed of, but the bulk of the export trade continues to be with the Dominions and the East. The steady course of values in most lines of chemicals—there are one or two exceptions—is still a notable feature of the market.

Heavy Chemicals

The demand for sodium sulphide is quiet, but there is not much change in prices; 60-65 per cent. concentrated solid is quoted at round £13 15s. per ton and crystals at £9 10s. Saltcake has improved a little, about £3 15s. per ton now being asked. Glauber salts are in limited request at £3 10s. per ton. Caustic soda is selling in fairly good quantities at from £15 12s. 6d. for 60 per cent. material to £18 per ton for 76-77 per cent. Bichromate of soda is still offering at 4d. per lb., but business is on a restricted scale. Hyposulphite of soda is attracting little attention; photographic crystals are quoted at £13 10s. to £13 15s. per ton, and commercial quality at round £9 10s. Prussiate of soda is in quiet demand, with current values at about 4½d. per lb. Soda crystals are steady at £5 5s. per ton, and a fair amount of business is being put through. Acetate of soda is only in small inquiry and quotations are easier at £21 15s. per ton. Chlorate of soda is in moderate demand, with prices maintained at round 2½d. per lb. Alkali continues to meet with a steady sale at £6 15s. per ton. Bleaching powder is still quoted at £9 10s. per ton, but business is not particularly brisk. Bicarbonate of soda is quiet but steady at £10 10s. per ton. Phosphate of soda is in moderate inquiry at round £13 5s. per ton.

Among the potash products caustic is firm at £31 to £32 per ton, though the demand is only on a moderate scale. Carbonate of potash is about maintained at the recent level of £23 10s. to £24 per ton. Permanganate of potash is in fair request at 7d. to 8½d. per lb., according to quality. Bichromate of potash is unchanged at 5d. per lb., but business is restricted. Prussiate of potash is steady and in moderate inquiry at 7½d. per lb. Chlorate of potash is still offering at about 2½d. per lb.

Little or no improvement in the demand for arsenic can be reported and values lack strength; white powdered, Cornish makes, is on offer here at round £35 per ton. Sulphate of copper is only in comparatively limited request, but prices are steady at £24 15s. to £25 per ton. Commercial Epsom salts are rather quiet at £4 to £4 5s. per ton, with magnesium sulphate quoted at £6 5s. Acetate of lime is only in small demand, but values are about unchanged at £15 10s. per ton for grey and £10 10s. to £11 per ton for brown quality. Nitrate of lead is quiet and easier at £41 10s. to £42 per ton. Acetate of lead is in moderate request at £47 10s. to £48 per ton for white and round £44 for brown material.

Acids and Tar Products

Tartaric acid meets with a fair demand and prices are firm at 1s. 0½d. to 1s. 0¾d. per lb. Citric acid is also a strong section at 1s. 4½d. to 1s. 4¾d. per lb. Oxalic acid still fails to attract much attention though values are still round 3½d. per lb. Acetic acid is quiet, but prices are not greatly changed from last week; 80 per cent. commercial is on offer at £41 to £41 10s. per ton, and glacial at £67.

Pitch is dull and easy at 42s. 6d. to 45s. per ton. Solvent naphtha is fairly active at 1s. 6d. per gallon. Cresylic acid is unchanged at 2s. to 2s. 1d. per gallon. Creosote oil is firm at 7½d. to 7¾d. per gallon. Naphthalene is in better demand at £15 10s. to £16 per ton for refined and £5 5s. and upwards for crude qualities. Carboic acid is quoted at 5½d. to 5¾d. per lb. for crystal and about 1s. 9d. per gallon for crude material.

Textile By-Products

Treatment and Possibilities of Waste Matter

IN the course of a lecture at the Clothworkers' Hall, London, E.C., on Monday last, Mr. E. B. Fry, Vice-Chairman of the London Section of the Textile Institute, dealing with textile by-products, said that cotton involved a seed which was becoming increasingly valuable, because of the enormous number of uses that were being found for cotton-seed oil. A large number of the soaps made here and in the United States were now made from cotton-seed oil. Enormous quantities of cotton-seed oil were sent into Italy to be exported as olive oil, and the increase in the uses and productions of cotton-seed oil in the last twenty years had been tremendous.

The flax industry provided a similar case. The seed gave us linseed oil. The by-product again from the oil was the oil-cake which was largely used for fattening cattle. Going through the processes of preparing wool one came to wool washing where there was a certain by-product, wool-fat. It was found that there were very valuable by-products not only in the wool-fat but in the potash in the perspiration, and there had been elaborate machines constructed for the purpose not only of extracting this potash but helping to extract the grease. Wool-fat was known in the medical world as "Lanoline."

There were two or three methods of dealing with the wool washing to obtain this by-product. In the English system, as a general rule, and in the French system, the method was usually to extract the potash first by steeping the wool in water and gradually dissolving the potash.

At one time these waste washing liquors used to be poured to waste, but it was agreed some years ago that Bradford Corporation should accept these washing liquors into their drain and treat the sewage for degreasing, and they took out anything between £25,000 and £50,000 worth of grease from these washing liquors. At Roubaix in France—they were among the pioneers of taking out the potash by a special machine—extracting on an average well over £100,000 of potash every year from waste washing liquors. The solvent process never progressed in this country because of the danger of explosions, and it was largely killed in the Bradford trade by restrictions imposed by the Bradford Corporation who would not allow this operation to be carried on within the city limits.

Fertilisers and Feeding Stuffs

DR. JAMES CROWTHER, principal of the Mayer-Addis Agricultural College, Newport, lectured on January 31 on the work of the Departmental Committee on Fertilisers and Feeding Stuffs, of which he is a member. Dr. Crowther said that his committee attached great importance to obtaining the right of entry to factories and warehouses where goods were made or were lying for sale. If they could take effective action by sampling at the source there would be much less likelihood of adulterated or deleterious goods being sold. The trade was quite willing to agree to give the right of entry to factories and warehouses, and to consent to the compulsory making of all bags to indicate the place of origin and the nature of their contents, provided that in turn it would be given relief from criminal responsibility for goods that had passed beyond their control, and that the veto of the Ministry of Agriculture on "frivolous" prosecutions would be retained.

Company News

JURGENS, LTD.—A dividend is announced at the rate of 7 per cent. per annum on the preference shares for the half-year ended December 31.

SOUTH METROPOLITAN GAS CO.—The directors recommend the payment of a dividend for the year of $5\frac{1}{2}$ per cent. on the ordinary stock, less the interim dividend of $2\frac{1}{2}$ per cent. already paid.

BORAX CONSOLIDATED, LTD.—The directors recommend the payment of a final dividend of 1s. 6d. per share ($7\frac{1}{2}$ per cent.), less tax, on the deferred ordinary shares of the company, making, with the interim dividend paid in November last, $12\frac{1}{2}$ per cent. for the year ended September 30, 1924.

MOND NICKEL CO., LTD.—The directors announce an interim dividend for the year ending April 30, 1925, of $3\frac{1}{2}$ per cent. on the cumulative and non-cumulative preference shares, and 5 per cent. on the ordinary shares.

HORACE CORY AND CO.—After placing £1,000 to general reserve, the profit for the year 1924 amounted to £15,491. The preference and interim ordinary dividends being paid, the directors propose a further dividend on the ordinary shares of 6 per cent., making 10 per cent. for the year, together with a bonus of $2\frac{1}{2}$ per cent., leaving £3,250 to be carried forward.

JOHN KNIGHT, LTD.—For the year ended November 30 last the profit amounted to £144,465, and £69,183 was brought forward, making a total of £213,648. After payment of the dividend on the 25 per cent. cumulative preferred ordinary shares for the year, absorbing £125,000, the directors recommend a dividend of 30 per cent. on the ordinary shares, leaving £67,648 to be carried forward.

BLUNDELL, SPENCE AND CO.—In their report for the past year the directors recommend a dividend at the rate of 8 per cent. per annum on the ordinary shares, and state that £17,042 will remain to be carried forward (against £15,024). After placing £1,500 to dubious and bad debt account, this account, it is stated, has £13,701 standing to its credit. The gratuity fund will amount to £3,372, and the investments of the Longstaff pension fund amount to £16,828. During the past year £16,504 has been spent on maintenance, repairs, and additions, of which £14,904 has been charged to revenue, and £1,600 to Hull premises account.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

TAR.—Tenders invited for the supply of 230,000 galls. (Nos. 1 and 2 standards) for Westmorland County Council. County Surveyor, by February 13. 12,000 galls. distilled tar for Littlehampton District Council. Clerk, Town Offices, by February 11.

HEAVY CHEMICALS.—A firm of general merchants in Santiago is desirous of securing the representation of British manufacturers of heavy chemicals and industrial machinery. (Reference No. 138.)

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained.

Opposition to the Registration of the following Trade Marks can be lodged up to March 4, 1925.

"ETHERIUM."

454,322. For a preparation for the prevention or removal of boiler scale, and for similar anti-corrosive purposes. Actinium Developments, Limited, 71, Moorgate, London, E.C.2; manufacturers. December 6, 1924.

"DURAQUA."

454,405. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. W. W. Hill, Son and Wallace, Limited, Irwell Paint and Varnish Works, Elton Street, Broughton Bridge, Salford, Manchester; manufacturers. December 10, 1924.

Tariff Changes

BRITISH GUIANA.—Revision of duties affects the following articles among others:—

Article.	Amended Rates of Import Duties.	
	British Preferential Tariff. Dols.	General Tariff. Dols.
Dynamite and preparations of nitro-glycerine certified by the Government Analyst to contain less than 75 per cent. of nitro-glycerine, blasting gelatine, gelatine dynamite, or gelignite, guncotton and all other explosives admitted by the Comptroller of Customs as explosives for blasting purposes	per lb. 0 02	0 04
Gunpowder, rackarock and fuses, admitted by the Comptroller of Customs as explosives for blasting purposes	per 100 lb. 0 50	1 00
Gunpowder, other	per lb. 0 10	0 20
All other explosives, other than fireworks, not admitted by the Comptroller of Customs as explosives for blasting purposes	per lb. 0 20	0 40
Wood naphtha or methanol, not purified so as to be potable....the liquid gallon	0 25	0 50
Methylated spirits, certified by the Government Analyst to contain not less than 10 per cent. of wood naphtha and three-eighths of 1 per cent. of Dippel's oil or of mineral naphtha	the liquid gallon 0 50	1 00

FIJI.—A Customs Duties Amendment Ordinance increases from 2d. to 3d. per gallon the import duty leviable in Fiji on the following oils imported from any country:—Oils, benzine, benzoline, gasoline, naphtha and other liquid products of petroleum, not otherwise enumerated in the Customs Tariff.

SIERRA LEONE.—The following are important revisions in import duties which came into force on January 1, 1925:—

Article.	Revised Rate of Import duty.	
	£	s. d.
Chemicals—		
Calcium carbide	per lb.	0 0 0 $\frac{1}{2}$
Dyes and dyestuffs	per lb.	0 0 5
Oil—		
Fuel	per Imperial gall.	0 0 9
Illuminating, including kerosene and other refined petroleum burning oils	per Imperial gall.	0 0 9
Lubricating	per Imperial gall.	0 0 9
Motor spirit	per Imperial gall.	0 0 4
Painters' colours and materials—		
Paints and colours	per 100 lb.	0 5 0
Paint oils, polishes and varnishes	per Imperial gall.	0 0 9
Turpentine and turpentine substitutes	per Imperial gall.	0 0 0

Birmingham University

In the course of the annual reports of the work of Birmingham University, the Principal reviews the various Faculties. The drop in engineering, he states, will right itself, but the drop in metallurgy is far more disquieting, in view of the importance of this branch of science to the staple industries of the Midlands. Trained metallurgists cannot be produced at a moment's notice, and it is a pity when students or industrialists show themselves to be unduly influenced by existing conditions, and forget that the long view of a situation really involves less risk. The mining school is full of life and energy, and the time has come when something more must be done for coal, as well as for petroleum engineering. In this connection the Principal comments on the acquisition of a new site and the equipping of the petroleum school, and says it is the settled policy to make this the finest school of its kind in the Empire. An extension of the chemistry block also demands serious consideration, and he expresses the hope that before long recognition will be given to biochemistry by setting up a separate department in that subject.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

FARINOL CO., LTD., Manchester, manufacturing chemists. (M., 7/2/25.) Registered January 22, £1,980 mortgage to Trafford Park Estates Ltd., Trafford Park; charged on properties at Stretford.

ROBERTS, GLAZEBROOK AND CO., LTD., Birmingham, oil and colour manufacturers. (M., 7/2/25.) Registered January 24, £4,000 (not ex.) mortgage to Bank; charged on property in James Road, Tyseley. *Nil. February 15, 1924.

Satisfaction

MARLEY HILL CHEMICAL CO., LTD. (M.S., 7/2/25.) Satisfaction registered January 23, £6,000, part of amount registered January 4, 1921.

London Gazette, &c.

Companies Winding Up Voluntarily

JEBEL DUWI PHOSPHATE SYNDICATE, LTD. (C.W.U.V., 7/2/25.) H. Bridson, 6, Rue de l'Ancienne Bourse, Alexandria, appointed liquidator, December 19. Meeting of creditors at the liquidator's office on February 9, at 4 p.m.

NEW NITROGEN SYNDICATE, LTD. (C.W.U.V., 7/2/25.) M. Tomlinson, Vickers House, Broadway, Westminster, S.W.1, appointed liquidator, January 27.

SALTS EXTRACTION SYNDICATE, LTD. (C.W.U.V., 7/2/25.) W. J. Walton, 62, London Wall, London, E.C., appointed liquidator, January 22. Meeting of creditors at liquidator's office on Monday, February 9, at 10.30 a.m.

VENO DRUG CO., LTD. (C.W.U.V., 7/2/25.) J. Blakey, Junior, 42, Spring Gardens, Manchester, chartered accountant, appointed liquidator, January 23. Meeting of creditors at the liquidator's offices on Monday, February 9, at 12 noon. Note.—This meeting is purely formal for the purposes of the Companies Acts. All outstanding accounts have been or will be paid in full.

Application for Discharge

MANGOLD, Louis Augustus, and MANGOLD, Charles Bernard, carrying on business in co-partnership under the style of MANGOLD BROS., 17, Harp Lane, E.C.3, chemical merchants. (A.F.D., 7/2/25.) Hearing, February 20, 11 a.m., Bankruptcy Buildings, Carey Street, London, W.C.2.

New Companies Registered

HEYL AND HEYL, LTD., 36, Victoria Street, London, S.W.1. Consulting chemical engineers, etc. Nominal capital, £100 in £1 shares.

LAFANA SYNDICATE, LTD. Manufacturers of and dealers in solid and liquid fuel and fuel briquettes, etc. Nominal capital, £300 in £1 shares. Solicitors: Freeman, Haynes and Co., 11, Great James Street, Bedford Row, London.

LEHMANN'S (AFRICA), LTD., Peninsular House, Monument Street, London. Merchants, commission agents, exporters and importers of and dealers in all kinds of vegetable, mineral and other produce; to carry on metallurgical and chemical operations, etc. Nominal capital, £3,000 in £1 shares.

RAVENS KINGFIELD, LTD., 149, Fenchurch Street, London. Chemical and produce merchants; manufacturers and exporters of and dealers in nitrates, iodines and other chemical products. Nominal capital, £1,000 in £1 shares.

STOURBRIDGE GAS CONSTRUCTION AND ENGINEERS, LTD. Manufacturers, designers and suppliers of and dealers in gas and chemical plant and machinery, etc. Nominal capital, £5,000 in £1 shares. Solicitor: William Waldron and Son, Brierley Hill.

The Magadi Soda Co., Ltd.

Further Hearing of Proposed Scheme of Arrangement

THE scheme of arrangement between the Magadi Soda Co., Ltd., which has a concession of soda deposits in Kenya Colony, and its share and debenture holders was again before Mr. Justice Eve in the Chancery Division on Friday, January 30.

Mr. Pennell, an opposing debenture holder, commented on the evidence tendered by the British Trusts Association, Ltd., the trustees for the debenture holders, in reply to his charges that the debenture holders were not informed of the proposed reconstruction of the company, and that the trustees and allied trust companies purchased a block of 30,750 debentures. He said that all through their dealings with the scheme the trustees were considering, not the interests of the debenture holders, but only their own interests, and they wanted to remain trustees. His Lordship had to consider whether the trustees were fit and proper persons to be appointed.

The Reconstruction Scheme

Mr. Bennett, K.C., for the British Trusts Association, said the charge levelled against the association was, first, that they sacrificed the interests of their clients to their own, and, second, that they gave no information to the debenture holders while, at the same time, they were using information for the purpose of picking up debentures, either for themselves or the trust companies with which they acted, as cheaply as they could. It was quite obvious that it was in the interest of everybody that there should be a reconstruction. There was one quarter from which help might be expected if cash was required to put the company on its feet, and that was from Brunner, Mond and Co. They were accordingly invited to join in such a scheme of reconstruction, and the only terms on which they would take part were that any cash they put up should take priority of the debenture holders. That was undesirable from the debenture holders' point of view.

His Lordship said that he would like Mr. Bennett to give some explanation as to the transfer of the debentures obtained by the various trust companies. The Industrial General Trust got theirs at 35 and other companies had theirs at 35½, 35½, and 35½, but there seemed to be no transfer at anything like that price; 46 was the lowest up to that time, and the average before that was well over 60, and the minute book said that they resold for 35½.

The hearing was adjourned till February 9.

An X-Ray Discovery

At the Royal Society of Arts, Adelphi, on Monday, Mr. V. E. Pullin, Director of the Radiological Research Department, Woolwich, gave the third and last of the Cantor lectures on "Radiological Research." He traced the early applications of X-rays, and showed that many modern applications were suggested and used during the first few months after the discovery. Modern uses of X-rays in Government Departments were illustrated, including the examination of heavy castings for flaws, and also the routine use of X-rays for inspection purposes. During the last week, Mr. Pullin said, some new apparatus, designed and made in Woolwich, had enabled them to penetrate a mass of steel 4 in. in thickness, which constituted a "record" in X-ray penetration.

The X-ray spectrometer of Sir William Bragg was described, as were also the construction of crystals and the manner in which they "reflect" X-rays. It was pointed out that X-ray "reflection" was very different from the reflection of ordinary light by a mirror. The vast number of industrial applications of the X-ray spectrometer was emphasised. It was stated that owing to very recent research on the question the X-ray spectrometer would prove of great value in the investigation of the question of strain in metals. A new and rapid method of determining the crystal size in metals by means of X-ray photographs was mentioned.

